COAL AGE

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DEVOTED TO THE OPERATING, TECHNICAL AND BUSINESS PROBLEMS OF THE COAL-MINING INDUSTRY

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Day Dreams

WHILE the anthracite wage conference discreetly avoids any public commitment as to when its deliberations will be concluded, there has been no dearth of full-bodied rumors drifting in from the mining fields. One of the latest declares that no agreement will be signed until the Supreme Court passes on the Guffey act because, if that statute is upheld, anthracite markets will be safe from further inroads by lowly bituminous. Even assuming that such a verdict could induce the bituminous producers to boost their domestic prices to present anthracite levels, it is necessary only to mention oil and gas competition to expose the emptiness of any such naïve belief for easy salvation. Anthracite's recovery depends on reducing its costs, not on lifting the prices of its competitors; operators know this, and no fond day dreams by the miners can alter the hard facts.

Bathhouse Returns

WHEN bathhouses were constructed under the British Miners' Welfare Fund many thought that the men on leaving the hot bath for the cold street would suffer from bronchitis, pneumonia and rheumatism. At first there was some complaint and absenteeism, but the men soon learned to use a tepid spray and thereafter were found to be in better health than ever, for they went on their way properly clad and in dry clothes. In Ontario, Canada, at one mine two rows of cooling sprays are provided under which everyone must pass, one tepid and one cold, and the men emerge in good condition for facing the rigors of the frozen North.

Bronchial disease inclines men to silicosis. Bathhouses that permit the miners to go home in suitable clothing, dryly clad, will meet this danger at least half way, though a chilly trip from the mine to the bathhouse may expose the miner to bronchial trouble if the bathhouse is not properly located. So also will men suffer from such ills if they have to travel in the cold intake air underground and in the shaft or in passing to lamphouse and powder house on chilly days or nights.

Before the new baths were established in Great Britain, men naturally had matches, pipes and cigarettes in their mining clothes, because they used to smoke on their way to and from work, but after street lockers were separated from mine lockers by a spray room, into which the men entered entirely unclad, only by willfulness and deliberate disobedience could they take such smoking materials into the mines. In Ontario, theft of high-grade ore was prevented by similar means.

Thus, bathhouses may be a profitable expenditure. They appeal to the miner's wife, improve the morale of the workman, save his time when he and others in the same family on arriving home have to wait their turn at the tub, and spare from defilement his car, his home, the public conveyance in which he travels and the clothes of his fellow passengers; and they also protect his health and promote the safety of the mine. The general introduction and proper construction of bathhouses will work a transformation in the miner's life.

Wet-Day Surplus

CONSERVATIVE ESTIMATES of the damage done by the recent floods run into the millions. Much of that damage can be repaired only by large investments in equipment and materials normally charged to the capital account of industry. For the most part, this investment will

be for replacements of structures and machinery covered neither by insurance nor depreciation reserves equal to the losses inflicted by the raging waters.

Prudent management which has saved up for the rainy days can draw upon accumulated corporate surpluses to take care of these necessary expenditures that will add nothing to the preflood value of the plant. But, suppose, as has been suggested, that the government levies upon new surpluses so heavily that immediate distribution is made to avoid punitive taxation. How then will industry pay the costs of future floods—natural, economic or political—and who will be the greatest sufferers?

Ventilation Receptivity

MANY operating men still fail to realize that they cannot pass any more air through their mines by installing a new fan unless they install one with a higher water gage, and that then they will pass only the air that the mine will transmit at that increased pressure—definite quantities based on the mine conditions and not on the type of fan. All fans that can produce the required air at any given water gage will give equal ventilation of the mine workings, and all fans giving equal ventilation in the same mine will have to produce equal gages.

Why, then, change fans? To get a different water gage, to get a fan that fits the mine's resistance and its needed air volume, or because one fan is more costly to drive than another and may have different characteristics. Efficiencies vary greatly, but any fan which will produce a certain water gage at any given mine will give as much air as any other fan that will give the same gage. If a mine will not pass enough air, a fan with a higher gage may be substituted or the mine passages may be made larger, more numerous, shorter, smoother or straighter.

A manufacturer can promise that his fan will deliver a certain quantity of air at a certain water gage only provided the mine will accept that quantity of air at that pressure. His fan will deliver more air at a given gage at one mine than at another, according to the receptivity of the mine. At one mine, a blower fan will deliver the air prescribed only to have the excess air come out again to the surface where it went in, whereas at another, the mine will take all the air driven in by the fan, and no power will be unnecessarily lost. Realization of these facts will save many costly mistakes.

Most mines need to replace their fans with others better suited to their needs and conditions, and many greatly need more efficient fans and fans that will be more efficient by reason of the correct relation in the mine between pressure and volume and because the fan is neither underrated nor overrated; but to install a fan to attempt the impossible is to invite heavy power expenditures without compensating advantage. Manufacturers fully realize the facts and do not seek to install fans unless they feel fully assured that they will be used at mines that are so constructed or reconstructed that they will accept the air which the fan will produce when operating within reasonable range of their maximum efficiency.

As with coal, one must not produce more than the market will absorb; so with air, one must not provide more than the mine will accept. With coal production, one can increase selling pressure or one can reduce consumer resistance by reducing price, thus making the market receptive; and with air, one can increase water gage or reduce mine resistance, thus making the mine more acceptive.

Broaden the Base

RECOGNITION of the necessity for cooperative action in meeting the problems of wages, freight rates and legislation was the genesis of most of the flourishing coal operators' associations now in existence. Their work in these fields writes its own history. Unfortunately, however, too many of these organizations appear to have been reluctant to extend their activities in other directions where both the common interest and the need for united attack are equally as great.

One fertile field still largely unplowed is the organized development of fundamental merchandising data. Many associations, it is true, have built up valuable distribution statistics and some have collected figures on past-sales transactions. But only a minority, it seems, have attempted such basic studies as the determination of the best methods for firing the coals produced in their districts. Too often this work has been left to the initiative of a few leading producers each acting independently. Here is a real, if prosaic, opportunity for constructive association effort.

Stripping at Bobolink is done by this 1,350-ton electric shovel with 30-cu.yd. dipper

NEW BOBOLINK STRIPPING

+ Uses 30-Yd. Shovel and 25-Ton Trailers

To Mine 36-In. Coal Seam

By IVAN A. GIVEN
Associate Editor, Coal Age

LAID OUT for an overburden-to-coal ratio of approximately 12:1, the Bobolink mine of the Binkley Mining Co., Seeleyville, Ind., seven miles east of Terre Haute, falls into the new class of stripping operations employing shovels with dippers holding 30 cu.yd. or more. Reserves of Indiana Fourth Vein coal of approximately 5,000,000 tons at Bobolink are expected to provide about ten years of work for the 30-cu.yd. stripping unit installed. The coal uncovered is loaded by a 5-cu.yd. electric shovel into 25-ton tractor-trailer units which haul the coal from the pit to the tipple, equipped for preparing and loading five primary sizes or combinations at an average rate of 300 tons per hour. First dirt was moved by the stripping unit on Nov. 20, 1935, and the first shipment from the preparation plant was billed out on Dec. 2. The mine is served by the Indiana R.R., with connections to the Chicago, Milwaukee, St. Paul & Pacific and Pennsylvania railroads.

Average thickness of the Fourth Vein seam over the territory to be stripped at Bobolink is 36 in.; the maximum is 49 in. and the minimum is 30 in. Dip of the seam is approximately 1 per cent to the southwest, and the stripping area lies between the outcrop (Fig. 1) and the 60-ft. overburden limit. Average thickness of the overburden is 30 to 35 ft.; the lower limit is approximately 15 ft. and the upper is 60 ft., the maximum to which stripping will be carried. Directly over the coal is a stratum of material ranging in character from a soft gray sandy shale to sandstone and from 1 to 20 ft. in thickness. Above the hard stratum is a sandy clay. Material immediately under the coal corresponds in character to that just above it, a feature of the Fourth Vein seam in the region in question. To date, it has not been necessary to blast the overburden. Ultimately, however, shooting will be adopted to facilitate shovel operation in the thicker and harder material which will be encountered.

Conforming with standard practice at most operations employing trailer haulage, runways are made at intervals through the spoil bank into the pit at Bobolink. These runways—700 ft. apart—connect to the main truck highway built along the outcrop. In the pit, the trailer units operate on a coal berm, which provides a firm roadbed in all weather. To date, pit length has been limited to approximately 2,500 ft.,

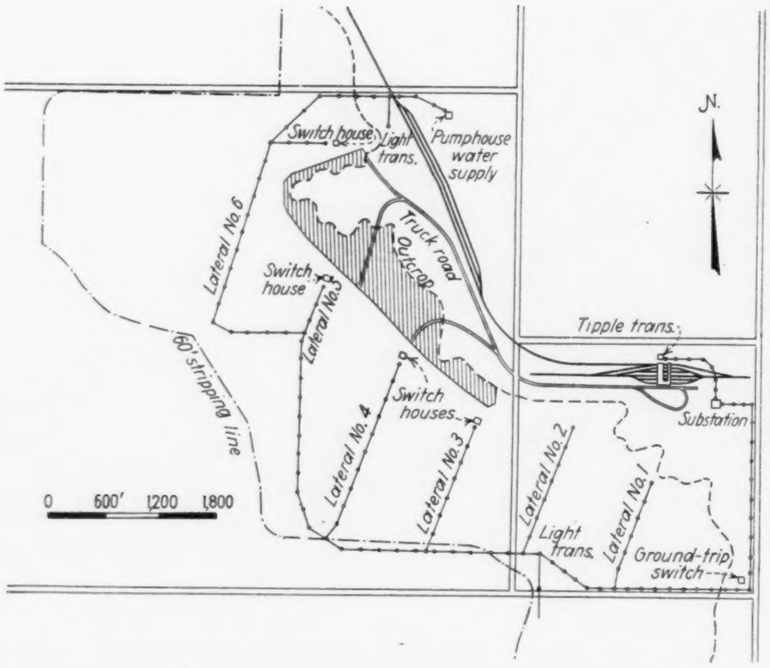


Fig. 1—Map of the Bobolink property showing present pit and runways, tipple and railroad location and power circuits

but eventually the length will be extended to a mile or more.

Standard pit width is 70 ft., measured from the bottom of the high wall to the bottom of the spoil bank. Standard width of cut made by the stripping shovel is 40 ft., which also is the width of the cut made by the loading shovel. The remaining 30 ft. of coal (Fig. 2) constitutes the berm on which the truck road is established. With a coal berm of this width, caves along the high wall are less likely to close off the truck road entirely; also, sufficient room is provided for two trailer units to pass if necessary or desirable. Normally, however, one-way traffic is the rule, the trailer units coming in on one runway and going out on the other. At times, in the end of the pit or when the stripping unit is between the loading shovel and the next runway ahead, the trailer units come in and leave by the same runway, turning in front of the loading unit. With a pit width of 70 ft., such turning, even with the large haulage units employed, presents no great difficulty.

Stripping at Bobolink is done by a Bucyrus-Erie 950-B electric shovel with counterweight, hydraulic steering and automatic equalizing jacks for leveling. Boom length is 105 ft. Length of dipper stick is 64 ft., and the effective dumping height is 70 ft. above ground level. Dumping range is 106 ft. The boom is of the structural type, and is made in two sections hinged at the shipper shaft. While provision is made for demounting the boom when necessary, both sections normally are fixed permanently in one position. Structural members tie the lower section of the boom to the A-frame; the upper section is held in place by flat-bar tension members. With this boom construction, digging strains fall largely on the lower section, while the upper section, which needs withstand only the stresses of pulling the dipper up through the overburden and supporting the load during the swing, provides the extra length necessary to place the hoisting ropes in proper relation to the dipper.

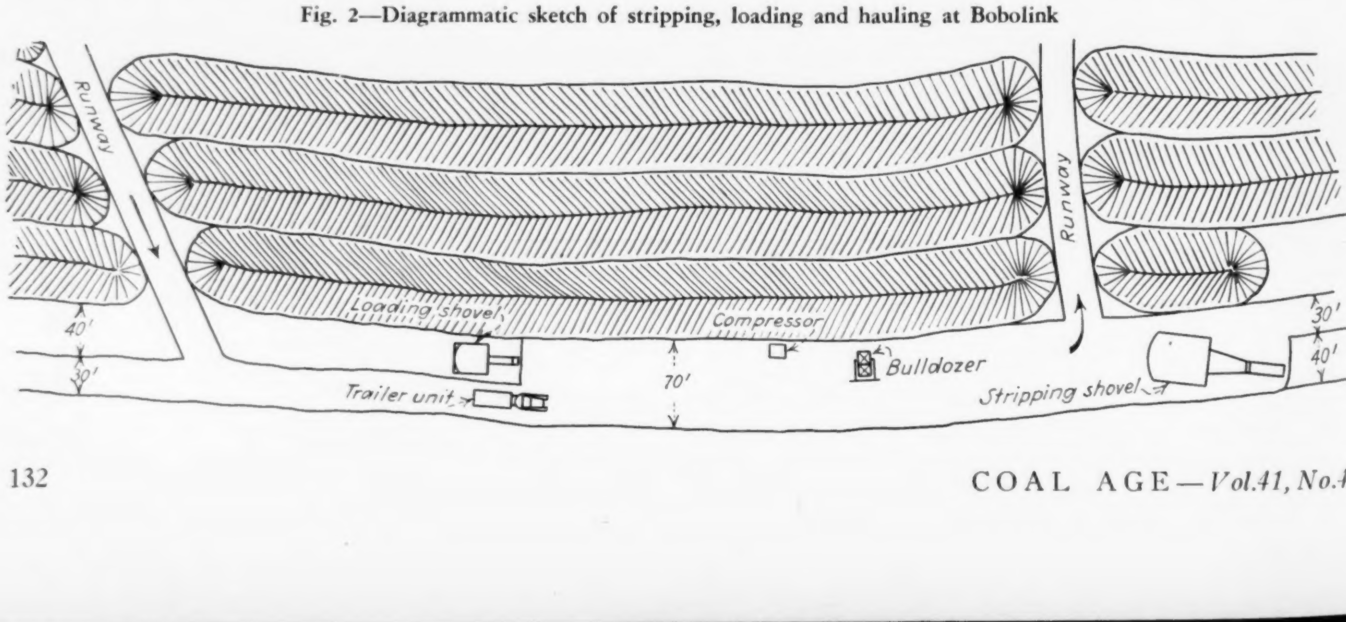
Another feature of the Bobolink stripper is the use of a cylindrical dipper stick and rope crowd, with the crowd motor mounted on the shovel platform. Two hoisting ropes spaced approximately dipper length apart prevent the dipper from turning from side to side during the digging cycle. Also, the stick is free to turn in its mounting and the boom therefore is relieved of any twisting stresses.

Twenty-eight motors totaling 2,284½ hp. supply power for the various shovel operations. This total includes one 1,000-hp. motor driving the hoist, crowd and swing generators, which supply 230-volt d.c. power to two 250-hp. hoist motors, one for each hoisting rope; two 125-hp. swing motors; and one 125-hp. crowd motor. Caterpillars are each powered by a 75-hp. 440-volt a.c. motor. With the exception of two motors on the stripper, electrical equipment (motors and controls) on both the stripping and loading units was supplied by the General Electric Co.

Dipper construction on both the stripping and loading shovels is based on the use of welded USS "Man-Ten" alloy steel (carbon, 0.35 per cent maximum; manganese, 1.25 to 1.70 per cent; silicon, 0.10 to 0.30 per cent; copper, 0.01 to 0.25 per cent; molybdenum, 0.00 to 0.40 per cent; vanadium, 0.00 to 0.20 per cent; tensile strength, 90,000 lb. per square inch; yield point, 55,000 lb. per square inch; elongation in 2 in., 20 per cent). This alloy is used for the bodies and doors of the dippers, which are equipped with manganese-steel bail, lip and renewable teeth. Adaptability to welding if broken during use was a major consideration in the selection of this alloy for the Bobolink dippers.

Pit layout and stripping equipment at Bobolink was selected to give an average daily output of 33,000 cu.yd. of overburden under normal conditions of operation. Record yardage to date is 35,000 cu.yd. in 22½ hours, or three 7½-hour shifts. The remaining 1½ hours in a normal stripping day is

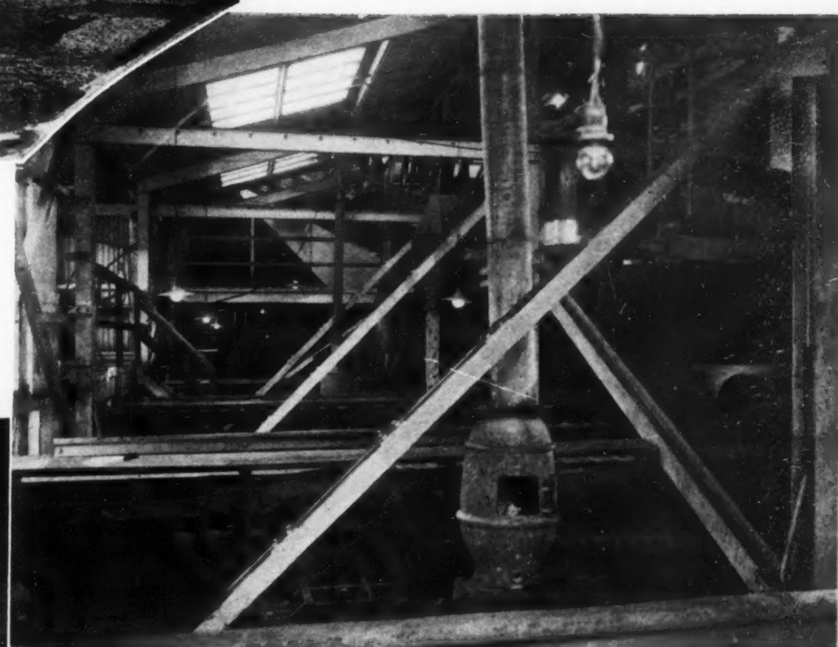
Fig. 2—Diagrammatic sketch of stripping, loading and hauling at Bobolink



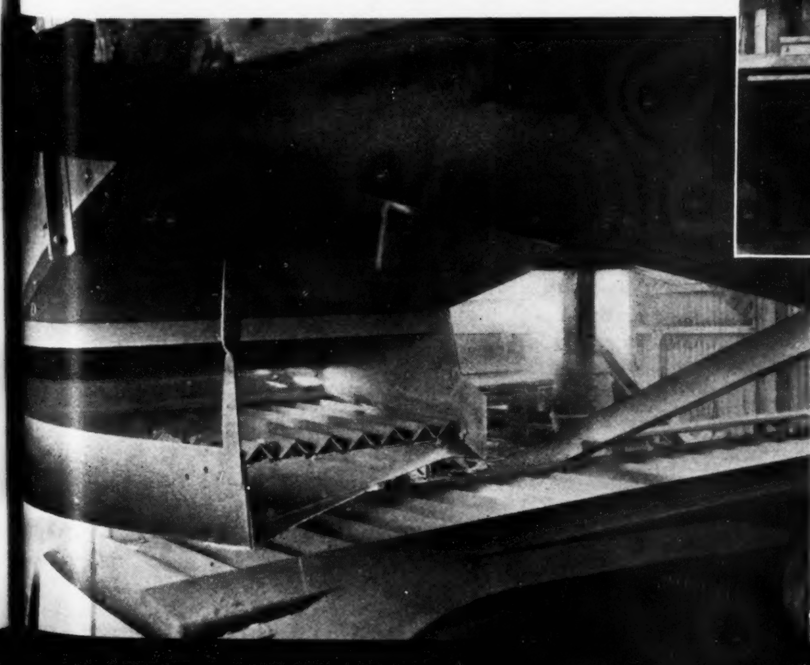
Coal is loaded by electric shovel with 5-cu.yd. coal-loading dipper into 25-ton tractor-trailer units

General view of pit, showing stripping; cleaning with bulldozer, hand shovels and compressed air; drilling and shooting; and loading

Bobolink preparation plant — main tipple at right, mixing conveyor and housing to the left



Picking floor in the Bobolink tipple with main shakers at the right and rescreening vibrator in the rear



Mechanical picker for 6x3-in. egg. Coal from the picker is discharged onto the egg picking table

made up of three half-hour luncheon periods. Average dipper load on the day of the record was 29 cu.yd., and the operating time included all delays. Time required for a complete digging and dumping cycle varies from 42 to 47 seconds under normal conditions and averages 45 seconds.

The stripping shovel is followed up by a Caterpillar "Fifty" tractor fitted with a bulldozer for removing the heavy dirt and refuse from the top of the coal. This material is moved over the foot of the high wall where it can be picked up by the stripper on its return trip. Finer material left by the bulldozer is removed by hand shoveling, after which the top of the coal is blown off with compressed air. Shotholes spaced approximately 6 ft. apart are then put down by two drillers with pneumatic drills. Air for the blowing and drilling operations is supplied at 125 lb. per square inch by a Sullivan WL-60 compressor mounted on skids. Shotholes are loaded with one stick of pellet powder each, and are fired with electric squibs.

25-Ton Trailers Receive Coal

Coal is loaded by a Bucyrus-Erie 75-B electric shovel equipped with a 5-cu.yd. dipper designed for loading thin coal. The loading shovel discharges into 33-cu.yd. 25-ton Austin-Western trail cars coupled to White tractors with four dual-drive wheels in the rear. Over-all length of the tractor-trailer units is 40 ft.; width is 104 in., and height is 101 in. Four units are now in service.

Skid-mounted pumping units made up of 4- or 6-in. centrifugal-type contractor's pumps direct-connected to 220-volt a.c. motors are used to dewater the pit. Discharge lines consist of rubber water hose, which carry the water up over the high wall to dams or drainage ditches. Dams are made by throwing clay dikes across the hollows with a Monighan walking dragline with diesel-electric drive and 3-cu.yd. bucket. The walking-type machine was chosen to facilitate operation over ground softened by rain, melting snow or running water, and it also is employed for ditching, road building, and miscellaneous dirt-moving or excavating work.

Power for the operation of the Bobolink mine is purchased from the Public Service Co. of Indiana and is received at the substation at 33,000 volts. Substation transformers reduce the voltage to 4,400 prior to sending it out to the various circuits serving the tipple (220 volts), pit, etc. Pit equipment is served by lateral circuits (Fig. 1) spaced 1,000 ft. apart. These laterals are pole lines and the pole spacing is 200 ft. At the end of each lateral in service is a skid-mounted switch house containing the necessary oil switches. Each switch house is accompanied by a bank of 4,400/220-volt transformers serving the 220-volt pit equipment, including pumps, air compressor, etc. Rubber-covered trailing cables rated at 500 volts connect this equipment with the transformers at the switch houses.

The stripping and loading shovels are supplied with 4,400-volt power through 1,000-ft. General "Super-Service" rubber-covered trailing cables rated at 6,000 volts. Shovel motor-generator sets operate directly off the 4,400-volt circuits. Other a.c. motors on the shovels are supplied with 440-volt a.c. power by subsidiary 4,400/440-volt transformers mounted on the shovel frames. Under normal conditions, 1,000 ft. of trailing cable allows the shovels to operate from one lateral to the next without inserting extra lengths in the circuit. As the shovels move along the pit, trailing cables are detached from their respective oil switches and are connected up with the next group in succession. Laterals are shortened two pole lengths, or 400 ft., at a time as the pit advances. Switch houses, on the other hand, are kept as close to the high wall as feasible to permit the shovels to operate within the limits of the 1,000-ft. trailing cables, and are moved back as required until it again becomes necessary to shorten the laterals. Short lengths of cable connect pole lines and switch houses.

Tipple Prepares Five Sizes

Coal from the Bobolink strip pit is prepared in a five-track steel tipple with a rated capacity of 300 tons per hour designed and built by the McNally-Pittsburg Manufacturing Corporation. Equipment includes shaker screens, steel-apron-type picking table-loading booms and crushing, rescreening and mixing facilities for preparing and loading at one time all or a part, or combinations of two or more, of the following sizes: 6-in. lump, 6x3-in. egg, 3x2- and 2x1¼-in. nut—all hand-picked and boom-loaded—and 1¼-in. slack.

Raw mine-run from the pit is dumped from the trailers into a 75-ton steel bin, from which it is fed onto a chain-and-flight elevating conveyor leading up the head of the shaker screens. One primary screen in two sections separates the feed into 6-in. lump, 6x3-in. egg and a 3-in. resultant. Lump and egg go to their respective picking tables, while the 3x0-in. size is discharged onto a secondary shaker mounted under the upper half of the primary unit and inclined in the opposite direction. On the secondary shaker, the 3x0-in. fraction is separated into 3x2-in. nut, 2x1¼-in. nut and 1¼-in. slack. The two nut sizes go to their respective picking tables, and the slack is conveyed to the slack chute, except when it is to be incorporated in a mixture, in which case it is run to the bottom strand of a cross conveyor, in turn discharging onto the bottom strand of the mixing conveyor.

Boom sections of the picking table-loading booms are not housed, but project out into an open bay between the tipple proper and the structure housing the mixing conveyor. In case a mixture is to be loaded, a boom (or booms) is raised to discharge onto the bottom strand of the mixing conveyor, which carries the coal to the proper loading chute. If lump, egg or nut sizes—all or part—are to be broken down, the booms are raised to discharge into the upper strand of the mixing conveyor, which conveys the coal back to an adjustable double-roll crusher set between the conveyor strands. The mixing conveyor, however, is extended far enough beyond the crusher so that by closing the gate to the crusher hopper, coal may be carried on over to the boiler bin, which supplies plant requirements. The crusher product can be discharged either onto the bottom strand of the mixing conveyor or, if rescreening is desired, onto the top strand of the cross conveyor, which carries the crushed coal to a Tyler-Niagara vibrator in the main tipple, where the coal is separated into 2-in. slack and oversize. Both oversize and slack can be run to a loading chute, or the oversize can be returned to the main mine-run conveyor feeding the primary shakers.

Mechanical Pickers Added

Mechanical pickers have been added to the Bobolink tipple to facilitate picking the 6x3-in. egg and 3x2- and 2x1¼-in. nut. The picker for the 3x2-in. nut is installed on the end of the secondary (or nut) shaker; units for the 6x3-in. egg and the 2x1¼-in. nut are installed in the respective back chutes carrying these sizes back to the tables. Angles placed as in the accompanying illustration, showing the 6x3-in. egg picker, make up the units. Width of the slots between the angles was determined by an inspection of the refuse material in each size treated. To enable the pickers to clear themselves, slots are widened slightly from the feed to the discharge end. As the refuse generally is flat, compared to the cubical nature of the coal, it falls through the slots, while the coal passes on to the ends of the pickers. Under conditions prevailing at Bobolink, loss of good coal through the pickers is slight and a substantial volume of refuse that otherwise might not be detected and picked out is removed. Operation of the mechanical pickers is in each case followed up by hand-picking in the usual manner.

ONEIDA COLLIERY

+ Builds Jig Breaker

And Cracks Coal in Rock House

BELIEVING that the jig breaker has advantages because of the flexibility of small units, each operating on a single size, the Wolf Collieries Co., of Freeland, Pa., recently erected a jig-and-Hydrotator-operated breaker on its leased property at Oneida, 10 miles west of Hazleton, thus saving the 18-mile haul to Drifton, where hitherto the coal had been cleaned.

Coal arrives at the breaker from some of the underground workings in mine cars and from No. 8 by railroad cars. Stripped coal also is brought in both by mine cars and motor trucks. Here it is dumped into the receiving hopper of a scraper conveyor, the railroad cars and trucks delivering on the north side and mine cars on the south side. A 12x48-in. scraper conveyor drags the coal up a $22\frac{1}{2}$-deg. inclination to the top of the roll house, which is entirely separate from the breaker, and from which latter nothing larger than egg leaves. There large rock is picked on the bull-shaker platform by six men, one of whom breaks up the largest of the lumps with a pick, so as to prevent injury to the rolls.

Sizing Coal Before Jigging

On the bull shakers coal is sized to lump-and-over, broken and finer sizes. Lump-and-over goes to No. 1 rolls and is reduced to broken-and-under. This is screened to separate egg-and-under, and the broken thus obtained joins with the broken from the bull shaker and is picked, at present, by one man. The stream of broken goes to No. 2 rolls, where it is crushed to egg-and-under and the entire product from all sources is delivered to a 12x36-in. scraper which carries it to the top of the "breaker," which in this instance is a cleaning, sizing, storage and loading plant, but entirely without rolls except for the crushing of jig reject and flats.

This coal then goes to two banks of sizing shakers which separate it into egg, stove, nut, pea, buckwheat and rice-and-barley, with provision to make No. 4 buckwheat later. Each of the sizes, except rice-and-barley, goes to a feed pocket holding from 30 to 35 tons, one pocket for each jig. Thus, in case the jig needs repair, the pocket can be used to hold an entire hour's product for that jig, and the rest of the breaker continue in operation meantime. Moreover, with this provision, if enough coal of the size the jig treats is not available for continuous operation, the jig can be allowed to lie idle with a full bed until sufficient coal for efficient operation has accumulated. Thus the jig can always be operated with an even bed or thrown temporarily out of commission if it cannot be run otherwise to suitable capacity.

Egg, stove and nut decks of the sizing shakers are provided with flat-coal picker segments on their extreme ends, so that any flat coal will pass through them and by means of side-discharge chutes, immediately under the deck, will be diverted either to a separate pocket for cleaning in a flat-coal jig for that size or, where the proportion of flat coal exceeds what the market will accept, it will go to the chipping rolls, where it is cracked to nut-and-smaller. In the flat-coal jigs, all the coal being of the same character, adjustments can be set to best suit that type of coal material.

Eliminating Flat Coal

The flat-coal picker segments consist of a varying number of what are known as Perriser treads which are set in the bottom of the shaker with a slight tilt endwise so that when the coal reaches any one of them in the series it will be carried an inch or so upward. When the shaker goes backward, the inertia of the coal causes it to travel up the plate and fall down on the shaker, or on a similar plate beyond. When the shaker goes forward again the coal by its inertia would tend to move backward in relation to the shaker, and, if the piece is thin and flat, it can readily make such a relative movement backward under the slat. As each slat has an opening under it, the backward movement of the flat coal traps it through the shaker, causing it to fall to the flat-coal chute for that size of coal. Thicker pieces of coal cannot go under the slat and are carried forward with the shaker and continue to travel forward when the latter travels back. Were the slat tilted the other way, the thick pieces would be jolted against the upturned slat and would refuse to go further, thus clogging the shaker. For this reason the slot is contrived so as to permit flat pieces to travel in the reverse direction to the main travel. In all, there are eleven primary jigs in Oneida breaker, one for flat egg-stove-and-nut, one for round egg, three for round stove, two for round nut, two for pea and two for buckwheat.

Bone to Chipping Rolls

All the refuse from egg, stove, nut and pea is re-treated in two jigs, to remove good bone, which is crushed in the chipping rolls to nut-and-smaller. Reject from these jigs is final refuse and goes to the slate bank. Coal from these rock jigs, after chipping, goes by a conveyor to the breaker feed and is washed in the primary jigs with the other coal. This same conveyor is used to transfer to the feed conveyor all degradation from the lip screens and the condemned coal, if any.

Clean coal from the various jigs goes to pockets for the various sizes. Rice-and-barley comes direct from the sizing screens to the Hydrotator, where it is cleaned and sized, and goes direct to pockets for those sizes. The Hydrotator is designed with an improved cone-shaped bottom, so to increase the refuse capacity and, in consequence, the overall efficiency. Coal is loaded out direct from pockets to railroad cars or trucks.

Make-up water comes from a 2,250,000-gal. reservoir constructed to the south of the breaker and 3,500 ft. distant, connected with the water system of the plant by a 10-in. Transite pipe line. In No. 4 slope, a 150-hp. centrifugal au-

tomatic pump has been provided, which lifts water out of the mines when surface streams do not suffice to fill the reservoir; a 100-hp. centrifugal automatic pump lifts the water from the reservoir to the breaker; 1,400 gal. of water is needed per minute. Power for the plant is provided by the Pennsylvania Power & Light Co., and the distribution voltage is 440 a.c.

Breaker and roll house were constructed by E. E. Reilly, of Kingston, Pa., and all machinery was furnished by the Wilmot Engineering Co. and consists of standard Wilmot crusher rolls, Parrish shakers and sizing screens, Type D Simplex jigs and Keystone rivetless chain conveyors. Both buildings are heated by Trane heater units; motors and their controls were furnished by Westinghouse; V-belt drives on conveyor lines by Worthington and the pumps by Barrett-Haentjens.

Breaker recently constructed at Oneida Colliery, Schuylkill County, Pennsylvania

Float in refuse is running by test: egg, 0.3; stove, 1.9; nut 1.1, and pea 2.7 per cent. The coal contains about 0.5 per cent slate and 1.5 per cent bone. In the roll house is a foreman who controls its operations and that of the dump, one man on the main conveyor and seven pickers. In the breaker are a boss, two men on the clean-coal jigs, one man on the Hydrotator, one on the rock jig, two on the shakers, one on the main conveyor, and no pickers—a total of eight.

All the coal beds in the Eastern Middle anthracite region are folded into regular anticlines and troughs running almost due east and west. In the center of the property leased to the Wolf Collieries Co. is an anticline that brings the Pottsville Conglomerate measures to the surface of the ground. The road between Hazleton and Shenandoah travels along this anticline, and to the north and south of it run troughs or synclines paralleling the road and constituting the North and South Basins, which, as stated, run roughly east and west.

These are V-shaped troughs with slopes running up to 60 or 70 deg. The entire area of both of these troughs within the east and west limits of the property is comprised within the lease, all four outcrops being within the property lines. The South Basin is nearly 5 miles long and the North Basin 2.16 miles. The Oneida property has been almost entirely worked by chambers, and throughout has been developed by gangways. In consequence, the entire regularity of the deposit has been proved. Only in the area undrained by tunnels is there any unchambered coal.

In the South Basin are two operating openings, Shaft No. 3 and Slope No. 4, and in the North Basin is Slope No. 8. When the mines were operated by Coxe Bros. & Co., Inc., a 7,100-ft. water tunnel was excavated from the South Basin and a 5,000-ft. water tunnel from the North Basin. The tunnel in the latter drains three out of four levels and in the former two out of three levels. As work is not proceeding in the fourth level of the North Basin or the third level of the South Basin, there has been no need thus far to install or operate pumps. These tunnels discharge into the Nuremberg Valley to the north of both basins.

Beds mined are the Mammoth, Wharton, Gamma and Buck Mountain, though a bed immediately underlies the last of the four. This probably is a split of the Buck Mountain. It has been found only in a stripping on the North Basin. Whether it extends any distance has yet to be proved.

The Mammoth bed is in three splits, the top one from 10 to 12 ft. thick, the second 5 ft. and the lowest 3 ft. Both of the dividers between these splits are 4 or 5 ft. thick. They make it easy to get an excellent percentage extraction from this bed despite its thickness. The top split is extracted first, then the second, and lastly the bottom split. The Wharton bed is 3 or 4 ft. thick, the Gamma 5 ft., and the Buck Mountain 10 to 12 ft. Only a small area of the Mammoth appeared in the South Basin, and it already has been completely extracted.

Breaker Not Over Workings

Because of the geological and geophysical conditions, it has been possible to locate the breaker, roll house and railroad so that they are not over any of the coal beds and yet are conveniently situated. Coal is brought to the breaker by five locomotives, and is hauled underground by four compressed-air units and by about 60 mules. The cars are raised to the surface by steam hoists. All the cars have a capacity of 92.3 cu.ft.

To remove the pillars, which are 24 ft. wide, a hole is driven up through the center of the pillar. This is made 6 ft. wide and provided with a manway. When the full distance is reached, the hole is enlarged at the upper end for the full width of the pillar, and the opening is funneled in such manner that when shots are fired the coal runs down the slopes to the pillar hole and falls on a platform a few feet above the bottom of the gangway.

Here the rock is sorted out by the miners and piled around the edges of the platform until the coal has been shoveled into cars on the gangway. Sometimes a battery has to be constructed to restrain the flow of coal to the platform. As soon as enough rock to fill a car has accumulated it is shoveled into a car provided for its transportation. Rock, of course, sometimes

Stripping Equipment at Oneida Mines

Equipment	Location	Coal Bed	Dipper, Yd.	Boom, Ft.	Use
Mooney & Yaccino (all around No. 8 slope)*					
Electric Marion dragline, 1401	N. Basin	Top Split, Mammoth	2½	85	Strip
Diesel Marion dragline, 381A	N. Basin	Buck Mountain	2	70	Strip
Gasoline Bucyrus convertible dragline, 43B†	S. Basin	Underlying Buck Mtn.	1¾	60	Strip
Gasoline Koehring shovel	N. Basin	Top Split, Mammoth	1	22	Coal
Gasoline Osgood back hoe	S. Basin	Underlying Buck Mtn.	1¼	22	Coal
Gasoline Osgood back hoe	N. Basin	Buck Mountain	1¼	22	Coal
Pennbrook Drayage Co.‡					
Diesel walking Monighan shovel	No. 3 shaft S. Basin	Underlying Buck Mtn.	2	70	Strip
Diesel walking Monighan shovel	No. 4 slope S. Basin	Buck Mountain	2	70	Strip
Gasoline Lorain shovel	No. 3 shaft S. Basin	Underlying Buck Mtn.	1½	22	Shallow strip and coal
Gasoline Lorain shovel	No. 4 slope S. Basin	Buck Mountain	1½	22	Shallow strip and coal

*Uses seven trucks; 3 Macks, 2 Sterlings and 2 Autocars; no railroad cars.
†Is to be converted to shovel and to be used in coal.
‡Coal from No. 4 Slope, S. Basin, is transported by 3 Macks and 1 G.M.C. truck, rest by railroad cars.

breaks from the roof, and the platform makes possible its separate disposition.

However, there always is an average of about 14 per cent of rock, and that with 11 per cent of buckwheat No. 4 makes 25 per cent of unrecovered loss —a low figure for some of the heavily pitching fields. At these mines every effort is made to reduce the quantity of rock transported to the breaker, and it is expected that provision will be made later to market the No. 4 product. As coal now goes to a breaker on the property, each car of coal can be identified. When it went into railroad cars and was hauled to the Drifton breaker, identification of the source of the rock was less easy.

All coal is drilled by hand. The company prefers to drive holes up through the pillar center, as it is safer and produces the coal with less loss than when skips are driven in the side of the pillar and the coal is allowed to slide down the old breast. Moreover, there is less rock to be handled. Only about 5 per cent of the material reaching the rock house is removed in that unit, leaving 20 per cent for removal in the jigs.

The mines generate no gas, though in a certain section M.S.A. Model K electric cap lamps are used, it being the practice for some years before the mines were reopened by the present management to operate this section with safety lamps. No gas has been noted by test since this section has been reopened, but, where water was found standing, methane was discovered rising in bubbles through it.

Several strippings are connected with this operation, details of which are listed in the accompanying table. In all, 4,200 acres is covered by the lease. The mines date back to 1885, or thereabouts, when they were started by Eckley B. Coxe. He built his own railroad track, but the coal is now handled by the Lehigh Valley R.R. For a while it was operated by Coxe Bros. & Co., and at times managed by the Lehigh Valley Coal Co. and the Jeddo-Highland Coal Co. After the lapse of about a year from its management by the latter, it was opened again by the present lessees, Wolf Collieries Co., Inc., a Freeland concern, operating in the latter district since 1908 and incorporated in 1915. Joseph G. Saricks is president and Palmer C. Saricks, his son, general manager, with Joseph G. Saricks, 2d, a nephew, manager of the Oneida operation. The mine is now producing 1,100 tons daily, but it is expected that the breaker will soon be cleaning 1,400 tons per day, as was the Drifton breaker before the change. Beahm & Co., Philadelphia, Pa., are general sales agents.

WELDED TRACK

+ Proves So Efficient and Smooth That Hanna Extends Welding Program

By J. H. EDWARDS
Associate Editor, Coal Age

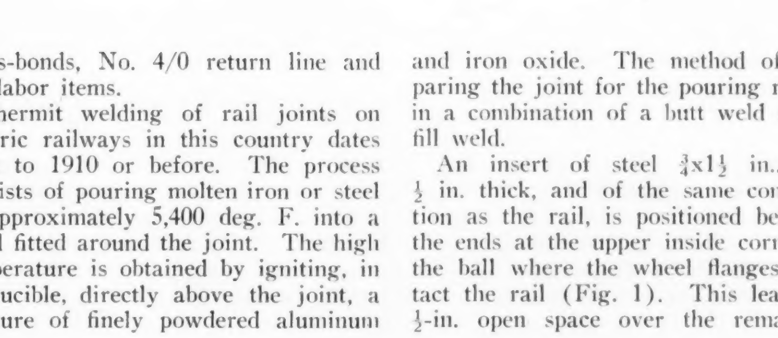
AS A RESULT of favorable experience beginning a year ago, when 3,000 ft. of main haulage track at its Willow Grove No. 10 operation was Thermit welded, the Hanna Coal Co., of Ohio, plans to apply the same welding process to the rail joints of 5,000 ft. of main haulage in Piney Fork No. 1 mine. In addition to the smoother track, which is easier on rolling stock, less likely to cause derailment and reduces coal spillage, other advantages of the continuous rail are elimination of joint maintenance cost and an increase of approximately 20 per cent in copper equivalent conductivity.

Experience and improvement on the 3,000-ft. job at Willow Grove indicate that a welded track laid with 60-lb. steel will not exceed by $50 per 1,000 ft. the cost of the angle-bar-joint and bonded track with auxiliary emergency No. 4/0 copper return which has been the standard for the Hanna mines. For the joints last made the labor and materials cost for Thermit welding was $5.75 per rail joint. Balanced against the above is the former cost of $4.09 per rail joint, which included angle bars, bolts, lock washers, joint bonds, cross-bonds, No. 4/0 return line and the labor items.

Thermit welding of rail joints on electric railways in this country dates back to 1910 or before. The process consists of pouring molten iron or steel at approximately 5,400 deg. F. into a mold fitted around the joint. The high temperature is obtained by igniting, in a crucible, directly above the joint, a mixture of finely powdered aluminum and iron oxide. The method of preparing the joint for the pouring results in a combination of a butt weld and a fill weld.

An insert of steel $\frac{3}{4}$x$1\frac{1}{2}$ in., and $\frac{1}{2}$ in. thick, and of the same composition as the rail, is positioned between the ends at the upper inside corner of the ball where the wheel flanges contact the rail (Fig. 1). This leaves a $\frac{1}{2}$-in. open space over the remaining

Fig. 1—Use of an insert improved the welding practice



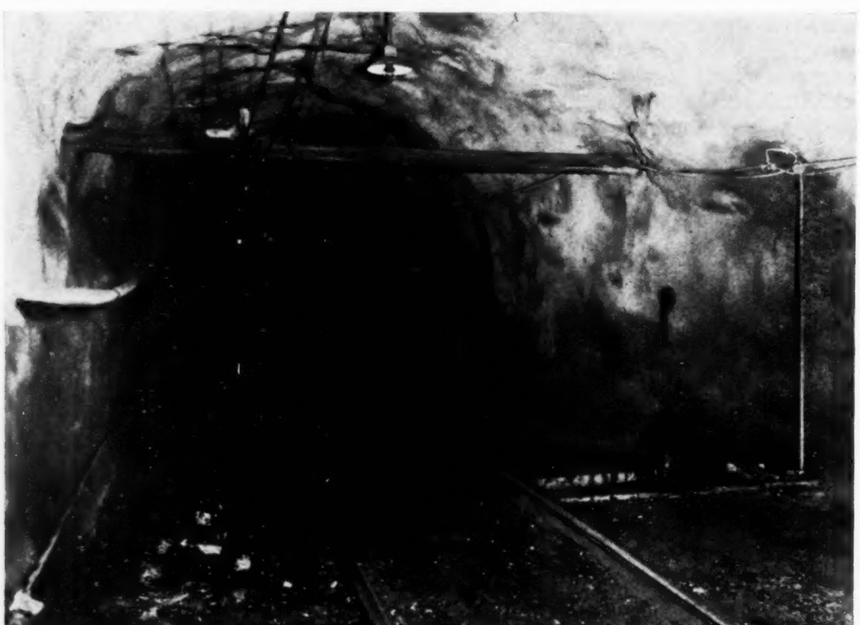
Left, note extra Thermit metal on the outside of the rail and the two steel ties beyond the wood ties at the joint. Right, the steel thimble used to plug the preheating hole remains fastened to the weld. Holes in the web indicate rail had been in use formerly with bolted joints

area between the rail ends. The mold is a combination alignment clamp which is tightened to hold the rails together so that the insert is under high compression. When the liquid metal enters the space between rail ends it brings the insert to welding heat, and the cooling of the Thermit-filled area brings about a shrinkage which effects pressure butt-welds between the insert and the ends of the rails.

Prior to ignition of the crucible mixture and the tapping or pouring, which is done a few seconds after the ignition, the rail ends and the inside of the mold are preheated to a bright cherry red by a kerosene torch which blows a flame into the mold through a hole at one side and close to the bottom. Another hole on the opposite side, also the riser hole at the top, act as vents during the preheating. When pouring is to take place, the torch hole is closed by a steel thimble backed with fireclay and the vent closed by sand and fireclay. With properly measured quantities of the Thermit the riser on top of the rail consists of only a small bump of metal. It is ground to rail level by a track-mounted motor-driven grinder which was built in the mine shop.

Every fourth tie of the new track is steel and the remaining ties are 4x6-in. treated wood. Slag to a depth of 6 in. under the wood ties is used for ballast and is worked into position with air tampers. For the most part this Willow Grove welding job, however, consisted of rebuilding a bonded track constructed a few years ago; this track was laid on 4x6-in. treated ties with two steel ties beyond the wood ties adjacent to the joint. The labor cost of aligning and leveling the rails ready for welding, and grinding, it was found, would have been less if new rails had been used.

On this 3,000-ft. stretch of main line the electric switch thrower at the right provides speedier and safer operation



The welding method described was adopted after experimenting with other methods on the first part of the job. Inserts were not used on the first joints but instead an acetylene torch was employed to cut an opening of about $\frac{1}{8}$ in. between the ends of the rails. An attempt also was made to use only fireclay in the mold, but it was necessary to return to the recommended practice of using high-test sand as the lining; this sand was backed with fireclay. Smoothing the top of the joint with hand files was first tried, but was abandoned for the grinding method.

Welding was done on week ends, with the crew working three shifts, beginning Friday nights. As to the skill required for the job, men of ordinary mechanical aptness became proficient after a few shifts of instruction under a supervisor furnished by the Metal & Thermit Corporation, which supplied the materials and molds. An increase of over 20 per cent in track conductivity is based on a comparison with bonded track not paralleled by a No. 4/0 copper return wire. The Thermit-welded 60-lb. track has approximately the same conductivity as perfectly bonded track of the same weight but reinforced by the 4/0 conductor.

AIR-SAND PROCESS

+ And New Sizing Facilities Installed At Logan County Coal Corporation Plant

By W. W. BEDDOW

Manager of Mines, Logan County Coal Corporation
Lundale, W. Va.

A WIDER MARKET through improved performance of the mine product in gas-coal and general-purpose fuel applications was the major objective of the preparation-improvement program completed at the Lundale plant of the Logan County Coal Corporation last year. The Chilton coal at Lundale is inherently low in ash and sulphur content, high in B.t.u. and has a high ash-fusion temperature. When well cleaned and uniformly sized, it is a favored fuel for gas, byproduct and high-pressure steam-generation purposes. The improvement program adopted, therefore, was designed to take full advantage of these natural qualities.

At this operation on the Chesapeake & Ohio Ry., in Logan County, West Virginia, two mine openings on opposite sides of Buffalo Creek deliver coal to a central tipple and preparation plant. Coal from the mine on the south side of the creek is delivered to the tipple by an apron-type lowering conveyor; coal from Big Vein mine on the north side of the creek is transported by an 800-ft. gravity-operated aerial tramway to the tipple, where the mine-run products from the two mines are mixed on the main shaker screen.

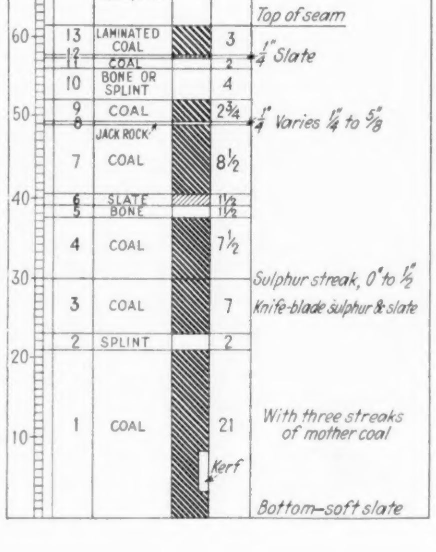
Coal Originally Hand-Picked

Prior to installation of the new preparation equipment, Lundale was served by a four-track shaker-screen tipple making lump, egg, nut and slack sizes over round-hole screens; lump and egg were hand-picked on apron-type tables and loaded over separate apron-type booms with degradation screens between tables and booms. Nut and slack were picked in the car.

Principal objectives in the improvement program started in the spring of 1935 were: (1) Removal of free slate and bone from nut and egg with sufficient range of adjustment to permit preparation of a superior gas coal or a domestic fuel; (2) reduction of ash and sulphur content of the slack to meet exacting industrial fuel requirements and maintenance of uniform quality; (3) shipment of coal in a dry state; and (4) perfection of the screening of the smaller sizes, with provisions for greater flexibility in changing and mixing grades to suit varying market conditions. Attainment of these objectives obviously required the installation of modern machinery to clean mechanically the small coal impracticable to clean by hand, addition of greater picking facilities for handling the larger sizes, and separate equipment especially adapted to sizing and loading the smaller sizes after cleaning.

The first move toward these improvements was a study of the coal to determine: (1) source and characteristics of the impurities in the raw mine-run product; (2) dividing line between small sizes to be mechanically cleaned and larger sizes in which the impurities are not broken out but require hand sorting to separate out mixed pieces for crushing and re-treatment; and (3) the most suitable kind of machinery for cleaning the small coal.

Fig. 1—Physical make-up of face sample at Lundale mine analyzed in Table I



Partings Furnish Impurities

Measurement and detailed analyses of the various component parts of the bed at many faces in the mine (see Fig. 1 for a typical example) showed that impurities in the coal as mined are almost entirely broken bands and partings. The drawslate roof generally is held up until after loading of the coal is completed, preventing mixture of the roof slate with the coal. Contamination by dirt from the floor is prevented by cutting 2 to 3 in. above the floor and leaving the bottom coal in place. Slate layers in the bed generally are partings which break free and clean from the coal into pieces that readily are picked out by the miner if large or are removable in the preparation plant if small. Bone and splint layers, on the other hand, generally are binders that stick fast to the coal adjacent to them and form mixed pieces. In the lump and egg sizes these mixed pieces and others containing thin streaks or caps of impurity must be crushed to free the impurities and then be recleaned mechanically with the small coal to prevent prohibitive loss of good coal. In the Lundale coal, the line of separation between sizes suitable for mechanical cleaning and larger sizes more adapted to hand sorting is at about 3 in.

At the south side Lundale operation, mining is done on the advance and to

Table I—Analysis of Face Sample From Lundale Mine Shown in Fig. 1*

Strata Number	Per Cent of Seam	Per Cent: Moisture	Per Cent: Volatile Matter	Per Cent: Fixed Carbon	Per Cent: Ash	Per Cent: Sulphur	Heat Content B.t.u.
1	34	.....	.....	.....	1.40	0.64	.....
2	3	.....	.....	.....	3.38	0.54	.....
3	11	1.00	35.16	57.66	6.18	1.24	13,911
4	12	.....	.....	.....	3.15	0.71	.....
5	2	.....	.....	.....	14.80	0.50	.....
7	14	.....	.....	.....	3.49	0.71	.....
9, 10, 11	14	.....	.....	.....	12.20	0.58	.....
10	6	.....	.....	.....	14.84	0.54	.....
13	5	.....	.....	.....	3.52	0.92	.....
1, 2, 3, 4, 7	75	1.03	35.37	60.68	2.92	0.78	14,816
1, 2, 4, 7	64	.....	.....	.....	2.26	0.68	.....

*No. 2 A Main, No. 4 Motor Chute, No. 3 Butt Entry at No. 12 Room.

Table II—Typical Float and Sink Data on Raw Coal

	1¼x3-In. Size				1¼x¼ Size			
			Cumulative				Cumulative	
Specific Gravity	Weight Per Cent	Ash Per Cent	Weight Per Cent	Ash Per Cent	Weight Per Cent	Ash Per Cent	Weight Per Cent	Ash Per Cent
Float at 1.35	81.3	3.1	81.3	3.1	82.4	3.0	82.4	3.0
1.35x1.145	10.6	12.9	91.9	4.2	11.0	13.3	93.4	4.2
1.45x1.60	4.7	25.8	96.6	5.3	3.8	26.6	97.2	5.1
Sink at 1.60	3.4	62.6	100.0	7.2	2.8	61.5	100.0	6.7

Table III—Mechanical Units in Preparation Plants

Cleaning Plant

No.	Description	Motor and Transmission	Total Hp.
2	24-in. inclined belt conveyor (raw coal)	7½-hp. gear motors and chain	15
1	Vibrating feed screen (slack)	870-r.p.m. motor; Texrope	10
1	Shaking feed chute (nut)	870-r.p.m. motor; Texrope	5
1	Screw conveyor for ¼-in. slack	Gear motor and chain	5
2	Air-sand separator boxes	5-hp. gear motors and chain	10
2	Air-sand desanding and sizing screens	15-hp., 1,150-r.p.m. motors; Texrope	30
2	4x5-ft. vibrating screens	2-hp., 1,150-r.p.m. motors; Texrope	4
2	30-in. belt sand conveyors	2-hp. gear motors and chain	4
2	30x8-in. belt and bucket sand elevators	20-hp. 1,150-r.p.m. motors; Texrope	40
2	12x30-in. Connersville blowers	15-hp., 1,150-r.p.m. motors; Texrope	30
1	Drag chain refuse conveyor	2-hp. gear motor and chain	2
1	3-compartment flight conveyor (clean coal)	20-hp. gear motor and chain	20
1	No. 12 Rotoclone (dust collecting)	40-hp. 1,150-r.p.m. motor; Texrope	40
1	Gravity discharge conveyor (crushed bone)	Gear motor and chain	2
1	Centrifugal blower (sand drying)	3-hp. motor	3
1	Nut loading boom	5-hp. gear motor	5
	Total connected motor capacity—cleaning plant		225

Motors in Old Tipple

	Total Hp.
No. 1 conveyor	30
No. 2 conveyor (booms and tables)	30
Main shakers	30
Mine-run conveyor	30
¾-in. crusher	15
Bone crusher	15
Lump boom hoist	5
Egg boom hoist	5
Nut boom hoist	5
Sampling crusher	5
Tripmaker and puller	15
Total connected horsepower (tipple and loading plant)	185
Total connected horsepower (tipple and cleaning plant)	410

Natural vein moisture of the coal averages 1 per cent, and the product is, in most parts of the mine, obtained from dry places. Hence conditions are favorable for shipping a uniformly dry product by using a dry method of cleaning.

Moreover, under Lundale conditions, the dry method has the further advantages that operation will not be subject to interruption by shortage of water in dry seasons or by freezing and attendant breakdowns in extremely cold weather. Continuous operation of the cleaning plant and freedom from water difficulties were given first consideration in planning facilities to permit shipment of a uniformly clean and dry product in all seasons. Since the ¼x0-in. slack is comparatively low in ash, sulphur and moisture, it may be bypassed without treatment and reassembled with the cleaned coal without greatly affecting the average analysis.

Table IV—Operating Labor in Lundale Preparation Plant

Preparation-plant foreman	1
Control-board operator	1
Lump pickers	4
Egg pickers	4
Loading-boom operator and trimmers	2
Slack-car trimmer	1
Cleaning-plant operator	1
Machinery greasers and inspectors	1
Railroad-car handlers	2
Samplers	1
Total	18

Table V—Typical Performance of Cleaning Plant

	Raw Coal	Cleaned Coal	Refuse
Moisture (per cent)	1.50	1.25	1.25
Volatile matter (per cent)	33.25	34.30	14.40
Fixed carbon (per cent)	58.25	59.95	24.50
Ash (per cent)	7.00	4.50	59.85
Sulphur (per cent)	.82	.72	2.72
B.t.u. per lb.	13,980	14,460	3,060
Fusion temperature of ash, deg. F.	2,750	2,850	.....

the rise, which is about 2 per cent. There are no breaks to the surface and the working places are, with few exceptions, dry. In the north side (Big Vein) operation, mining is on the retreat and there are breaks to the surface in pillar sections; this condition, combined with dips in the direction of mining, results in some wet places. Under normal conditions of preparation-plant operation, wet coal from Big Vein is mixed with a substantially larger proportion of dry coal from the Lundale (south) side.

Float-and-sink tests of samples of the small coal to be cleaned showed that the raw coal as it comes from the mine contains from 2 to 4 per cent of slate sinking at 1.60 sp.gr. Boney and mixed fractions between 1.35 and 1.60 naturally fluctuate widely in quantity, especially in the 1.35x1.45 fractions, which may vary from 4 to 12 per cent. Typical float-and-sink data on raw coal are given in Table II.

In the reconstructed plant, which uses the air-sand process, the small coal through 3-in. round-hole screens is dry cleaned in two 12-ft., 3-compartment cleaning units, one treating 1¼x3-in. nut and small egg and the other ¼x1¼-in. stoker coal. The ¼x0-in. fines are screened out of the feed and remixed with final end product from the cleaners. The 3x5-in. fraction of the egg coal is hand-picked on the table formerly used for 2x5-in. coal. Diversion of the 2x3-in. fraction to the new cleaning plant relieves this table of approximately half its former load and makes an ideal condition for hand-picking of the egg. Boney coal, streaked pieces and soft coal picked off this table and the lump table are crushed to nut and smaller and returned to the feed end of the main tipple, where the crusher product is separated into nut and slack sizes and delivered to the new air-sand cleaning plant for preparation.

Cleaned coal delivered by the air-sand

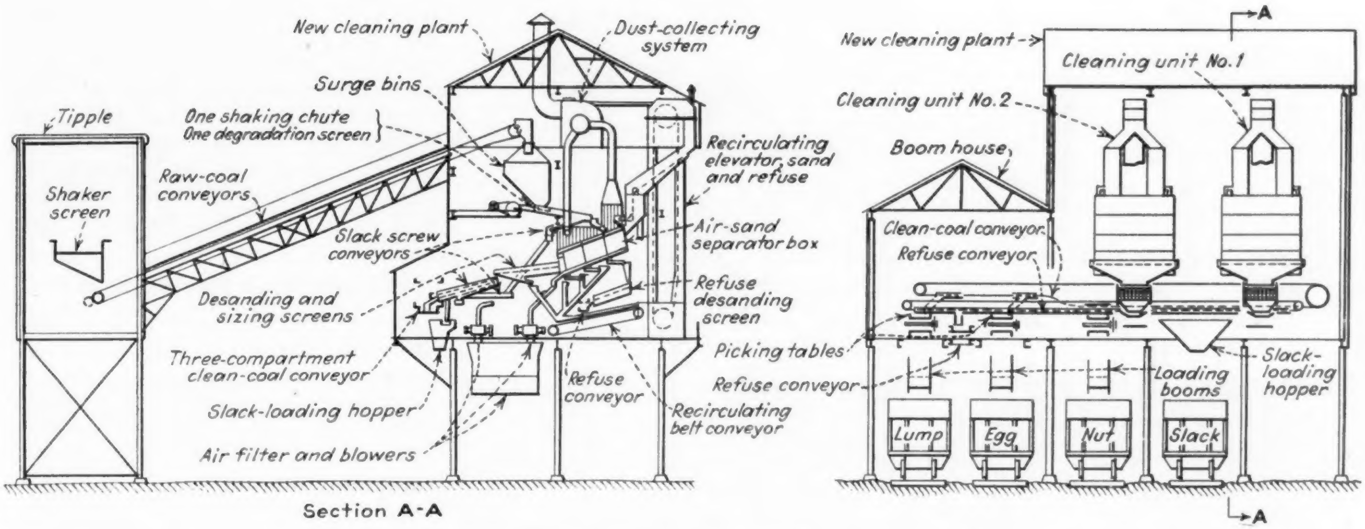


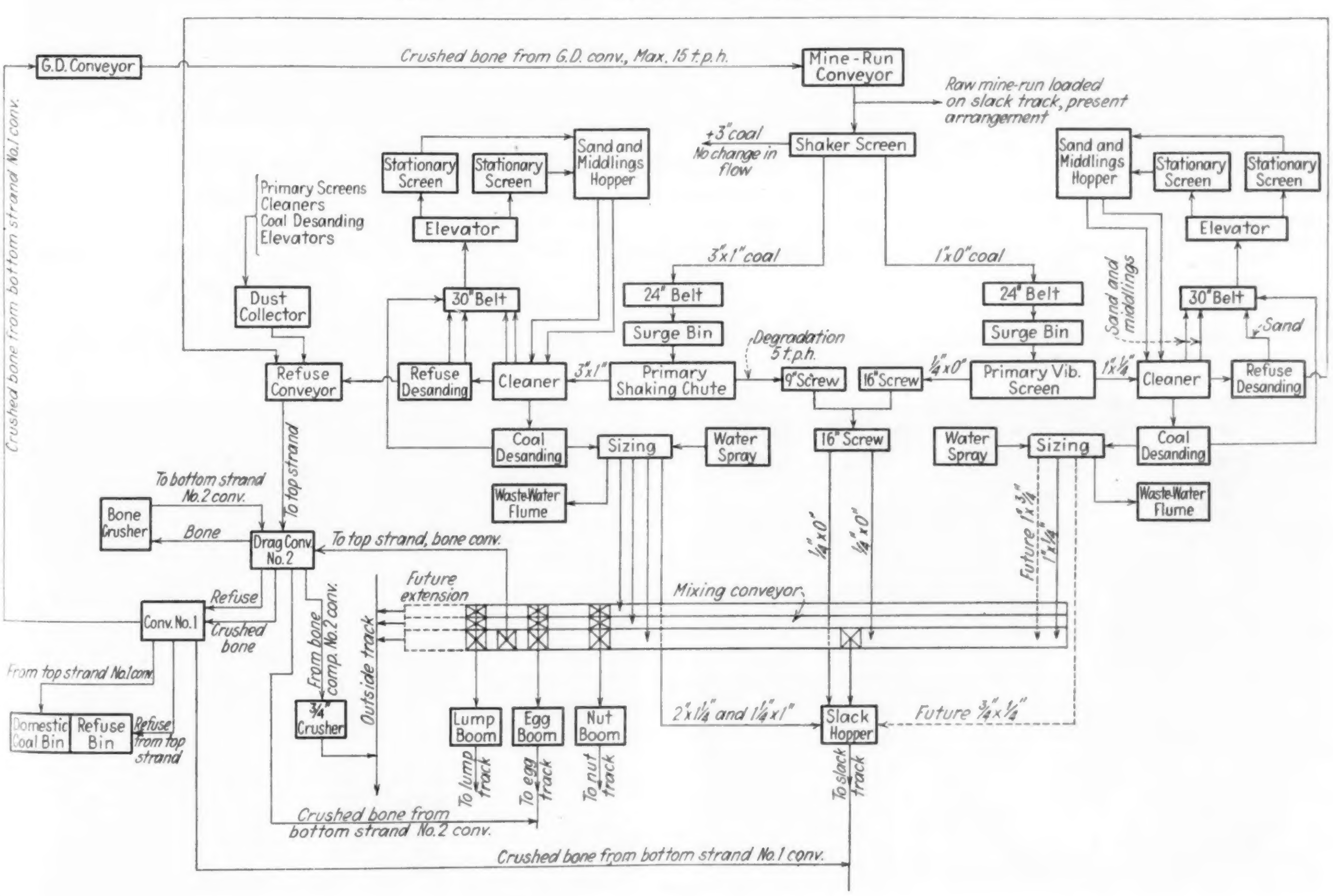
Fig. 2—Arrangement of equipment in Lundale preparation plant

separator boxes is resized over high-speed reciprocating screens to make the small commercial sizes, viz., 2x3-, 1¼x 2-, ¼x1¼- and ¼x0-in. A three-compartment conveyor running transversely across all the loading tracks provides for loading various mixtures or modifications of these grades. The inspection department of Amherst Fuel Co. (selling agent for Logan County Coal Corporation) maintains continuous float-and-sink control over the cleaning equipment by daily sampling and testing of the feed coal and both products and by individual sampling and ash determination on each car of cleaned slack produced.

Principal mechanical units in the new cleaning and sizing plant, with capacity, type of drive, and motor (listed in operating sequence; i.e., following the travel of the coal from tipple to car) are set out in Table III.

Raw coal is transported from the main tipple shaker into the top of the cleaning-plant building in two separate sizes by two 24-in. belt conveyors that deliver to duplicate 15-ton surge bins; the No. 1 unit receives 1¼x0-in. slack and the No. 2 unit the 1¼x3-in. nut and egg. The raw slack is drawn out of the No. 1 surge hopper by an air-sand screen 12 ft. wide and 10 ft. long which removes the ¼x0-in. fines and feeds the ¼x1¼-in.

Fig. 3—Flow of coal through Lundale preparation plant



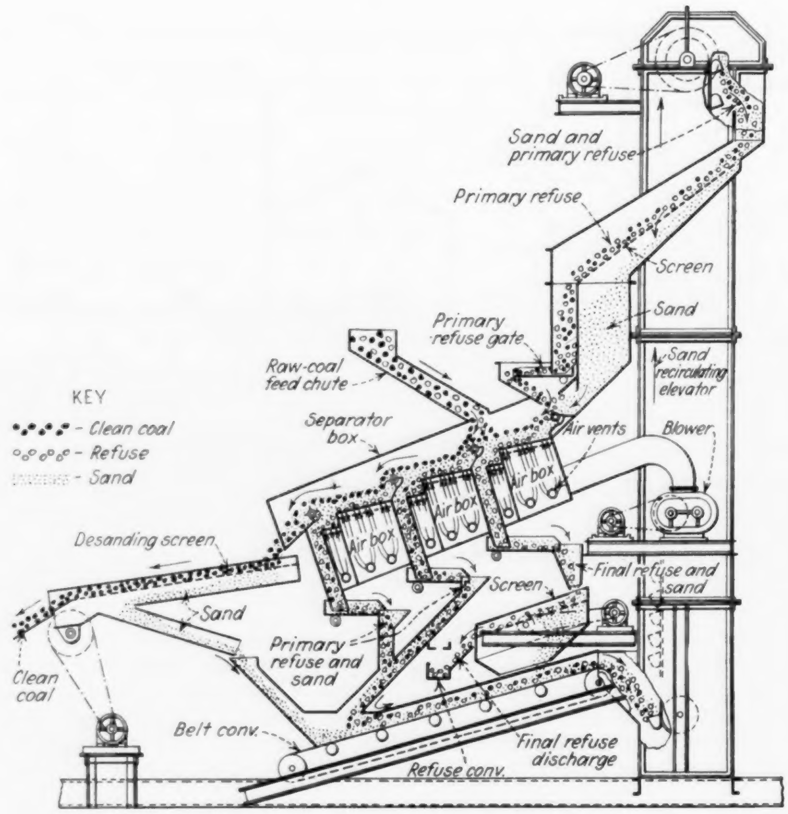


Fig. 4—Details of Lundale cleaner

raw coal to the No. 1 separator box for cleaning. This screen delivers the feed properly sized and spread uniformly across the entire width of the separator box—conditions essential to effective functioning of the cleaning process. The $\frac{1}{4}$x0-in. fines screened out of the feed go by a screw conveyor direct to the slack loading-chute.

Nut coal ($1\frac{1}{4}$x3-in.) is deposited in the No. 2 surge bin by a transverse distributing conveyor, which intercepts the coal stream from the 24-in. raw-coal conveyor belt and spreads it uniformly and without size segregation across the width of the bin. It is fed out of this bin by a 12-ft. wide shaking feed chute which delivers the feed uniformly across the entire width of the No. 2 separator box. The feed chute also carries a short section of degradation screen which screens out the $\frac{1}{4}$-in. slack in the nut coal and delivers it to the slack loading chute.

Each of the two 3-compartment air-sand cleaning units consists of a stationary sand box 12 ft. wide by 10 ft. long. Sand is circulated by 30-in. belt-and-bucket elevator, and air is supplied by a 12x30-in. Connersville blower delivering 2,500 c.f.m. at 0.5-lb. pressure. The blowers are driven by 15-hp. motors, and take air through two banks of "Staynew" dry-air filters in series which insure a clean air supply to the separator boxes and eliminate the possibility of blinding the decks of the separator boxes.

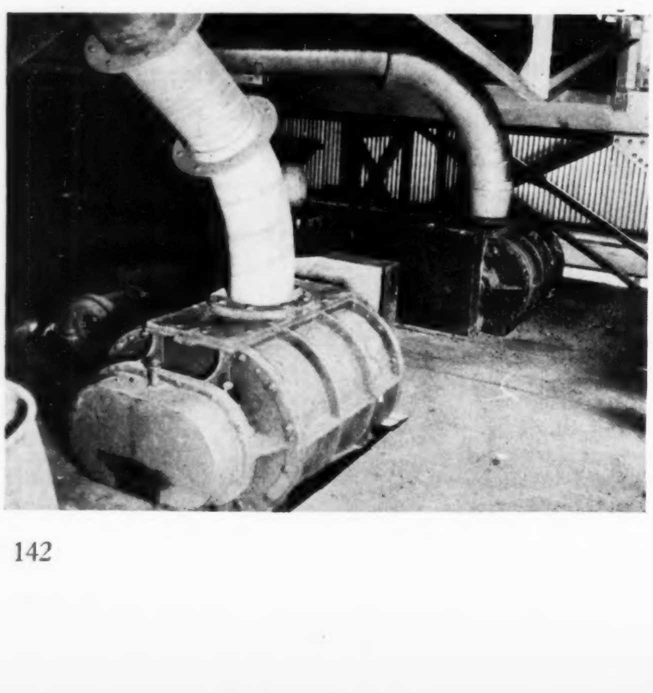
Cleaned Coal First Desanded

Cleaned coal delivered by the separator boxes passes over double-deck balanced air-sand screens; the top deck of each screen, covered with 10-mesh "Tyrod" cloth, removes the sand and delivers it to the sand-return conveyor, while the second deck resizes the coal into the desired commercial sizes and delivers them to the 3-compartment cross-conveyor by which any size may be loaded on either the slack, nut, egg or lump tracks. Lump and egg are loaded over booms already available in the existing boom house, and the nut over a new apron type boom installed in the new cleaning plant building. Refuse from the cleaning plant is conveyed to the rock bin in the tipple with the pickings from the egg and lump tables, to be disposed of by truck.

To minimize dust in the plant atmosphere the surge hoppers are covered and these hoppers and the separator boxes and screens are equipped with dust hoods connected to a 30-in. "Rotoclone" exhauster-dust precipitator, which handles approximately 21,000 cu. ft. of air per minute at a 3-in. water gage and requires 35 hp. Hoods over the separator boxes handle approximately 6,000 c.f.m. each, or more than twice the volume of air blown up through these machines in the cleaning operation. Hoods over the desanding screens each handle approximately 4,000 c.f.m.

The air-sand process of cleaning is

Two 12x30-in. blowers deliver 2,300 cu.ft. of air per minute to each air-sand separator box



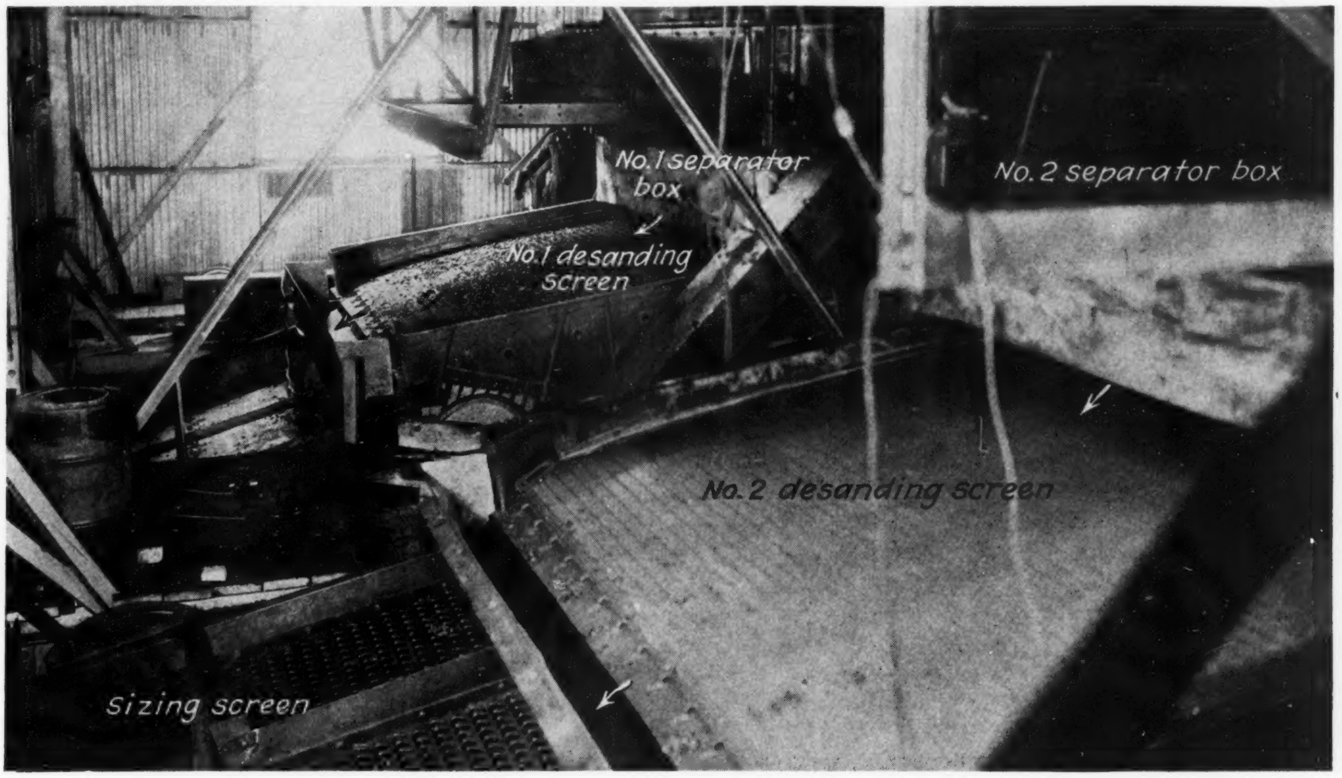
Dust is kept out of the plant atmosphere by this 30-in. exhauster-dust precipitator

essentially a float-and-sink method of separation using fluidized dry sand as the float medium. This liquid is formed by bubbling air continuously and uniformly through the sand in the separator boxes. In this condition the sand flows continuously through the boxes like the water in a washer box. By regulating the quantity of air, the specific gravity of the medium is adjusted to float the desired grade of coal, which overflows out the discharge end of the box with the sand. The slate and bone, which sink to the bottom of the sand boxes, are evacuated by shaking slate gates. Both end products are desanded over 10-mesh vibrating screens and the sand is returned to the storage hoppers that feed sand continuously into the separator boxes. The sand is aerated and made fluid only in the separator boxes.

Each of the 3-compartment air-sand units at Lundale consists of three successive float sections, or compartments, each with a refuse discharge gate. Raw coal is fed to the second compartment and the float coal overflowing this compartment is re-treated in the third compartment. The refuse product from these two compartments is discharged at the bottom of the box and returned to the No. 1 compartment, which is reserved for re-treatment of this primary refuse. Sink material from the No. 1 compartment is discharged to the refuse conveyor as an end product and any float coal recovered overflows into No. 2 compartment, where it joins the raw feed.

Sand used in the separator boxes must be of suitable size to be adjusted to a uniformly fluid condition, without violent boiling, by a small quantity of air. The most suitable grade is through 30-mesh and on 80-mesh. Chemical composition of the sand is immaterial. Two kinds have been used at Lundale plant: a crushed sandstone glass sand which carries around 2.5 per cent oversize on 30-mesh and 9 per cent through 80-mesh; and a river sand which has around 2.8 per cent on 30-mesh and 2.5 per cent through 80-mesh. The river sand has a more rounded grain than the glass sand, but both types are effective in the cleaning process. The cost of the glass sand delivered at Lundale, dry and ready for use, is $3.62 per ton. The river sand is recovered wet at a delivered price of $2 per ton on the dry basis. It must be screened through a 20-mesh screen and dried before charging it to the plant.

Sand is transferred from the sand house to the cleaning plant as needed by a compressed-air conveying unit consisting of a cylindrical receiver in the sand house and a 2-in. pipe line from the receiver to the sand-elevator boots of the cleaning units. To operate the unit the receiver is filled with sand and compressed air at an 80-lb. pressure is admitted, forcing the sand through the pipe line to the cleaning plant at the rate of approximately 60 lb. per minute. Air is furnished by the shop compressor. The sand circulated through the separator boxes is dried continuously by hot air delivered by a 28-in. Moore hot-air furnace, through which the air is circulated by a 5-hp. fan. The hot air delivered by the furnace is passed through the sand in the storage hoppers that feed the separator boxes and through the sand return spouts that deliver sand from the sand circulating elevators to these storage hoppers.



Arrangement of separator boxes, desanding screens and sizing screens in Lundale air-cleaning plant

To provide the most favorable conditions for effective operation, the cleaning units are run continuously as long as coal is available in the tipple, and railroad cars are changed on the fly in the loading plant. This is accomplished by holding coal on the booms and cross conveyor while changing nut or egg cars and by switching the slack stream to the incoming empty car by means of a two-way breeches spout on the loading chute when changing slack cars.

Start-and-stop control of the entire tipple and preparation plant is centered in one control board on the operating floor of the new cleaning plant. Signal and telephone circuits connect the tipple and loading plant with the central operating station. Motor starting boxes are interlocked for starting and stopping motors in sequence in the three separate groups: (1) loading equipment, (2) cleaning plant, (3) raw-coal handling. This is an effective safe-

guard against overloading of machines or spillage of material due to starting or stopping of machines in the wrong order, or due to kicking out of individual drives. Pilot lights on the central control board signal the operator when any motor stops.

To automatically prevent overflow of the cleaning-plant surge bins in the event of a shutdown in the cleaning plant or an excessive peak load of slack above the surge capacity, automatic cutoff switches are installed in the surge bins. These switches operate when the bins are filled. Operation of the No. 1 surge-bin cutout switch automatically stops the No. 1 raw-coal slack conveyor only; the raw slack in the tipple overflows the conveyor loading chute and is diverted automatically to the No. 1 tipple conveyor, which delivers to a raw slack car on an auxiliary loading track. Return of the slack flow to its normal channel takes place automatically with the starting of the belt conveyor and subsequent withdrawal of the coal from its loading chute. If the No. 2 bin fills up, the cutout switch stops the main tipple shaker and feeder from the Lundale mine and lights up a pilot light in the headhouse at the Big Vein mine.

An automatic overflow bypass chute also is provided at the loading end of the No. 2 raw-coal conveyor (1¼x3-in.) to divert this coal into the No. 1 tipple conveyor when egg coal is to be sent to the local domestic coal bin. This prevents robbing 3x5-in. coal out of the commercial egg size when house coal is loaded, diverting 1¼x5-in. coal for that purpose instead.

Two-hundred watt lamps with dome-type reflectors are placed inside the air-sand cleaning boxes and over the cleaned coal and refuse screens to provide most favorable conditions for inspection and adjustment of the cleaning operation. The lump and egg picking tables are housed under glass throughout their entire length to provide daylight for hand-sorting these sizes. Antifriction bearings are used on the vibrating screens, blowers and fans, and individual high-pressure lubrication with Alemite fittings is used through the new plant.

The new cleaning plant went into operation early in November, 1935, with indications of highly satisfactory results in quality of product, small loss of good coal in the refuse, and moderate operating costs. Elimination of virtually all the slate and heavy bone, reducing the 1.60 sink in the coal to fractional percentages, is accomplished with negligible loss of pure coal in the refuse. Removal of a large proportion of the light bone and intermixed fractions to make premium grades of coal is accomplished with losses of good coal in the refuse up to around 10 per cent of the refuse, which, with the percentage of rejects made in cleaning the Lundale coal, amounts to a bank loss of approximately 0.5 per cent.

Rated capacity of the plant is 300 tons of mine-run coal per hour with provision for 20 per cent surges above this rate. Approximately two-thirds of this tonnage is handled in the new cleaning and sizing plant. Operation of the new plant has not, at the present time, continued long enough to establish complete records of operating cost. However, the accompanying tables show approximately the labor and power costs of preparation. Of the entire preparation labor list shown, two men are allocated to the cleaning plant. Total connected cleaning-plant and tipple-motor load is 410 hp. and the total metered load in tipple and cleaning plant is 195 kw., or approximately 0.65 kw.-hr. per ton of coal handled. Sand loss is estimated at 1 lb., or 2 mills per ton of coal cleaned. Westinghouse motors and electrical equipment are used in the plant, which was designed and built by Stephens-Adamson Mfg. Co.

Lundale preparation plant with cleaning-plant addition in the right foreground. Retarding conveyor on right delivers coal from Lundale mine; coal from Big Vein mine comes across the valley by aerial tramway.

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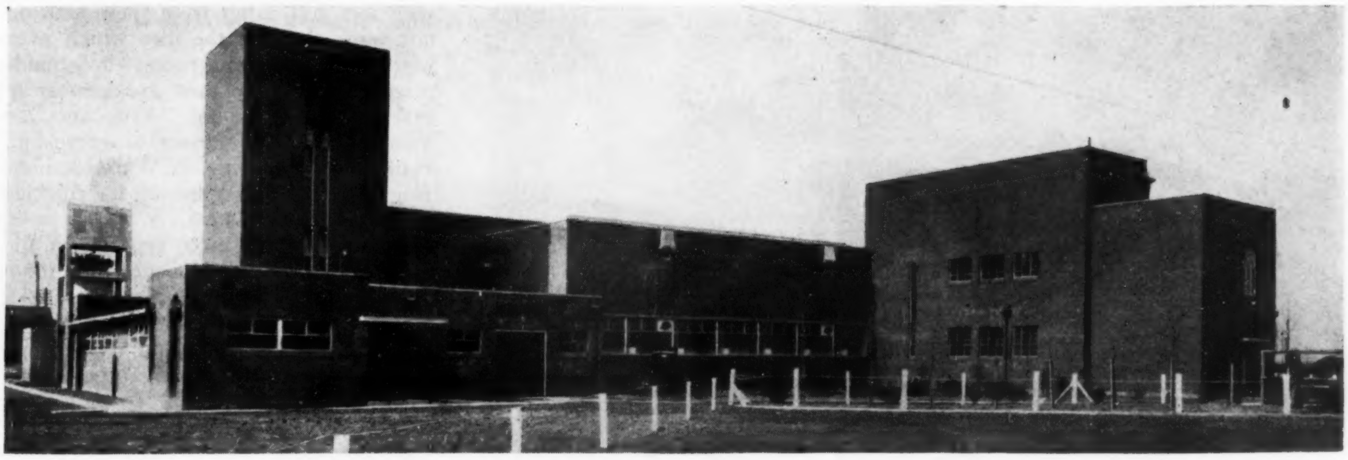


Thorne colliery baths, South Yorkshire, England

SPACIOUS BATHHOUSES

+Built by Miners' Welfare Fund At British Collieries

By R. DAWSON HALL
Engineering Editor, Coal Age

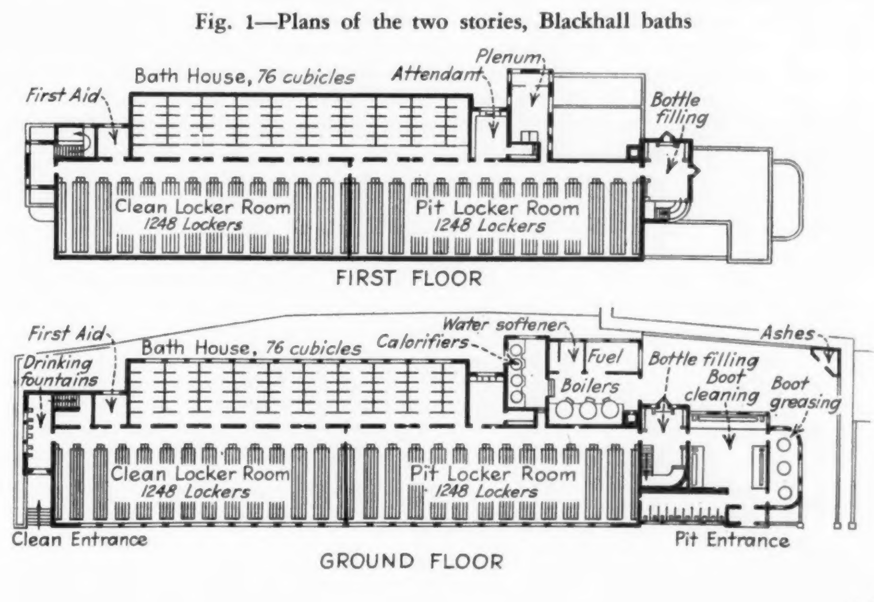
FROM the partial proceeds of a tax of 5 per cent on royalties paid for leased coal and another tax of 1c. per long ton on all coal raised (originally 2c.) the Miners' Welfare Fund of Great Britain has constructed spacious bathhouses for mine workers which give a maximum of comfort and hygienic safety. The management of the fund by which this has been accomplished was described in the March issue of *Coal Age*, pp. 105-107.

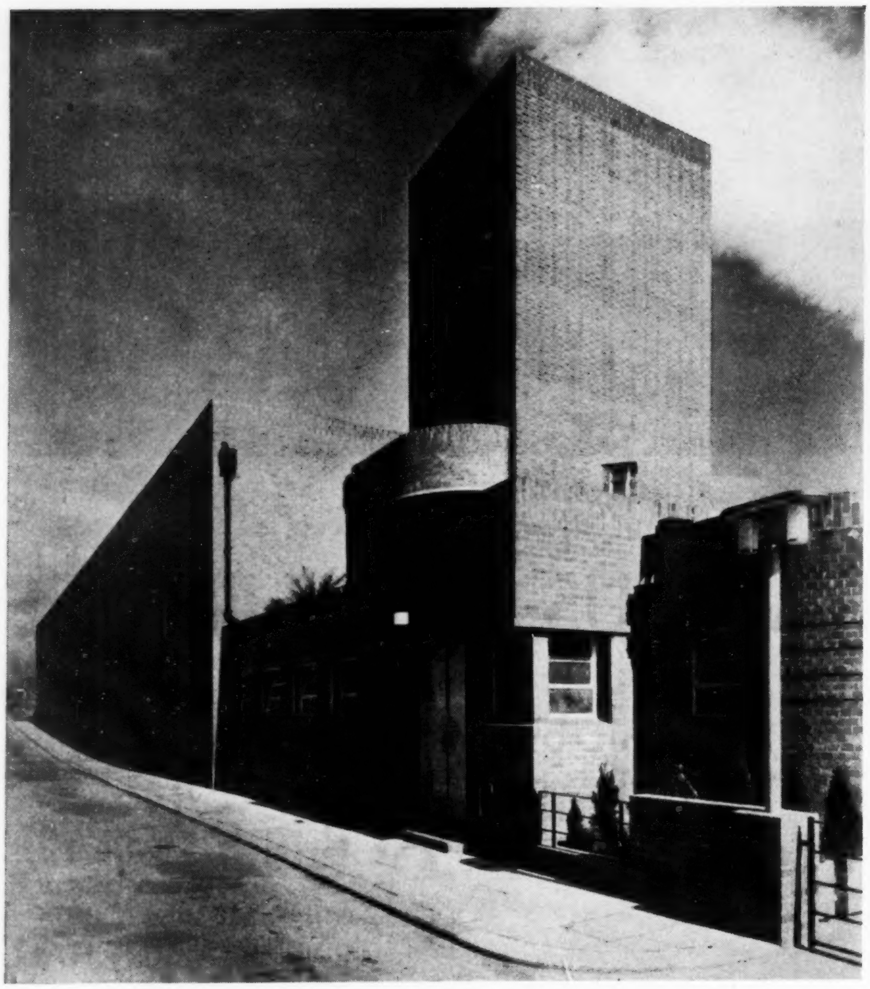
Exteriorly most of the bathhouses have a distinctly modernistic appearance, having flat roofs and extremely straight functional lines, but their simple design, devoid of frippery, appeals to the modern taste, results in marked economies and is well suited to use around collieries where dust is inevitable, though every care is taken to avoid it. Floors are made of hardened asphalt, especially in locker rooms and bathrooms, as asphalt is not worn away by heavy shoes nor is it too cold for bare feet. Little woodwork is used. Lockers are of galvanized steel and sprayed with aluminum paint. Windows have steel casings.

At Blackhall Colliery, in County Durham, England, for example, the bathhouse is two stories high, built on a narrow plot between a public road and a railroad. On leaving the shaft, the miners enter the door in the foreground with the staircase and water tower above it, with boot-cleaning and boot-greasing room on the right, with locker rooms for mine and street clothes on the left, facing the street, and with the bathroom proper on the railroad side of the building (Fig. 1). Men leave, after they have dressed to go home, from a door at the far end of the structure.

In the Blackhall greasing room, where the Blackhall miners grease their shoes, the dubbing apparently is placed in the receptacle at the top of each stand, and the miners put their feet on the rail during the greasing and cleaning operations. Therefore, their shoes are reasonably clean before they enter the "pit-locker" room. This is a real advantage because the grease is particularly objectionable if it falls on the floors of rooms where men are dressing or undressing. Clothes also can be freed of

Fig. 1—Plans of the two stories, Blackhall baths





Blackhall colliery baths, County Durham, England

their larger accumulations of dirt in the same convenient anteroom.

Sherwood pithead baths, located in Nottinghamshire, England, have the spacious covered swimming pool, pictured on p. 106 of the preceding issue. The pool is under the polygonal gable on the left of an illustration on p. 147, and a cycle parking space or "cycle store" is provided between it and the marquee which stretches over the walk. To the right is the bathhouse proper. The swimming pool cost in all $93,437.* Both pool and canteen, like the bathhouse, were constructed at the expense of the district fund. Roofed with concrete arch ribs, precast purlins and filler units, it seats 325 spectators in tiers along one side of the pool. Others than miners use this facility, but at a higher charge.

Thorne colliery bathhouse is in South Yorkshire, England. Here the pit-clothes locker room and shower room form the main part of the building and the clean-clothes locker room is at right angles to it, thus giving ample light throughout the building.

Table I lists the bathhouses described in the 1934 Annual Report of the Miners' Fund, showing recent construction and buildings under construction. (This is the latest publication of that institution.)

In our bathhouses and in, at least, many of those in Continental Europe, when a man has taken his bath, he has to return to the dressing room to put on his street clothes. As this same room is used by miners for removing their mine apparel, his street clothes become soiled with coal dust from contact with men who are undressing. They are also soiled when hung from the roof amid dirty clothes. Coal dust and other dirt indeed is always falling from mine clothes, whether when being lifted to the ceiling or when suspended therefrom, so that the air of the dressing room is clouded with suspended dust.

For this reason, the idea back of all these recent installations is to have the men go through the building without retracking: first through the pit entrance to the mine-clothes room, then to the shower; from this point to the clean-clothes room and lastly out by the street entrance. Thus, there is no need for a miner to wear his second-best on his way to and from the mine, for men fresh from the pit do not come in contact with men in street attire. Men also with feet still damp from their bath do not wade through the dirt which ever must accumulate in a room where mud-plastered or dusty men are constantly arriving and disrobing. As lockers for mine clothes are subject to corrosion, Haunchwood colliery, in Warwickshire, England, has had some of its cubicles made of stainless steel.

Cubicles are of three types: (1) the stall type, which furnishes minimum privacy; (2) the L-type, where the side walls are bent in the form of an L, so as to block vision; and (3) the T-type, where cubicles are in pairs and the short wall between each pair is in the form of a T, which also keeps out intruding eyes.

Every bathhouse, it is recognized, should have a first-aid room where men can apply antiseptics to any cuts or abrasions they may have received, but some companies desire to have incorporated a room for officials and an ambulance room, fully equipped, such as the law requires each operator to furnish. These are added if the company will undertake to pay the extra cost. At the Hall End bathhouse a laundry is provided for the washing of towels and mine clothes—the meanest job a miner's wife has to tackle. Though the central committee seems to favor such a development, the district committees do not appear to sense a need for it, and perhaps the miners would not cooperate in any such delegation of the work at their whole or partial expense. The committee also regards a repair shop as a desirable adjunct.

Cycle sheds and canteens also are regarded as suitable charges against district funds, if the men employed have to travel long distances to their work, though four district committees have refused approval to such expenditures. At Tilmanstone colliery, in Kent, England, an allocation of $4,867 was made for the construction of a subway leading from the pithead to the lamproom, the passageway tunneling under a public road.

At some British mines, principally in Lancashire and in some parts of Scotland, women are employed in the screening of coal. In all, not more than about 3,000 women are so engaged, but only a few are found at any one colliery. Bathhouse accommodation has been provided for 262 women. Two typical bathhouses for the female sex are those of Broomside, Lanarkshire, Scotland, and one at Maypole, Lancashire, England. The first provides for 26 women and cost $263.06, and the other, for 44 women, cost $146.00 per head, the high cost per person resulting from the few individuals accommodated. At the women's bath at Parsonage, Lancashire, provision is made for 204 women, and here a rest room is incorporated and a canteen, for which latter the company will pay the bill. Though the women leave work all at the same time,

*Pounds sterling are equated in these figures to $4.8665, but the relationship has varied greatly from time to time, being sometimes much less and sometimes more.

Table I—Bathhouses Recently Constructed, Their Accommodations and Cost

Name of Colliery	Men Accommodated	Shower Cubicles	Men per Cubicle	Cost	Cost per Man	Canteen Cost	Cycle Room
Great Mountain	1,202	94	12.78	$72,228	$60.10	$5,572	.....
Cardowan	792	65	12.18	65,698	82.98	4,039	.....
Astley Green	2,000	126	15.87	115,141	57.47	4,248	.....
Cefn Coed	2,496	200	12.48	140,214[1]	56.17	6,326	.....
Pennyvenie	600	54	11.11	47,012	78.35	......	.....
Coventry	1,890	96	19.69	82,779[2]	43.80	5,791	.....
Manvers Main	2,496	164	15.22	127,074[3]	50.91	7,786	.....
Bentinck	1,800	176[4]	10.23	86,721	48.18[4]	4,905	.....
Silverwood	3,400	160	21.25	142,174	41.81	5,431	$2,093
Hafodyrynys	988	74	13.35	81,976[5]	82.97	4,380	.....
Betteshanger	2,520	182	13.85	125,128[6]	49.65	8,687	.....
Whitehill	462	43	10.74	41,755[1]	90.38	......	.....
Hatfield	2,800	160	17.50	108,362	38.70	8,614	.....
Polmaise 3 and 4	720	48	14.96	49,395[1]	68.60	3,387	.....
Warsop Main	2,576	144	17.89	97,135	37.71	......	.....
Sherwood	2,000	128	15.62	93,436[7]	46.72	9,709	2,530

[1]Including sewage-treatment plant. [2]Including sewage- and water-treatment plant. [3]Including sewage pumphouse. [4]Including 22 without separate cubicles. [5]Including special foundations of reinforced-concrete piles in deeply made ground, and plant for treating water and generating electricity. [6]Including large sewage-treatment plant and special drying room. [7]Swimming pool cost $9,485. Costs of bathhouse are exclusive of canteen, cycle room and swimming-bath costs.

Table II—Bathhouse Charges Collected From Miners for Maintenance

Workers' Contribution per Week	Number of Installations
4 to 5c.	3
6 to 7c.	18
8 to 9c.	21
10c	12
12c.	47
14 to 24c.	11

Table III—Companies' Contributions to Bathhouses

Companies' Contribution		Number of Installations
Whole cost of upkeep		2
Cash per man per week	8c. or more	4
	6 to 8c.	11
	4 to 6c.	9
	less than 4c.	3
*Free services**		
Steam or coal and electricity		44
Steam or coal		14
Electricity		4
No contribution or contribution negligible		23

*In many cases services provided by colliery owners include part or all of the water supplied in addition to items mentioned.

Table IV—Cost of Erection of Bathhouses

Persons Accommodated per Plant	Number of Installations	Average Cost per Person
More than 2,500	15	$45.50
2,001 to 2,500	19	51.83
1,501 to 2,000	35	52.80
1,001 to 1,500	36	61.80
701 to 1,000	49	69.83
401 to 700	26	78.59
400 or fewer	10	85.65
All plants	190	$57.67

only eighteen cubicles are provided, it being expected that many will be disposed to use only the wash bowls. One district committee has provided for partial endowment of pithead baths from welfare funds, but the central committee, while permitting it, questions any such provision because of shortage of funds for meeting the program still to be completed and far from its goal.

On Dec. 31, 1934, to quote the most recently released figures, 186 installations with accommodation for 225,317 men and 262 women had been completed. The number of men employed at these collieries in December, 1933, were 218,329, whereas the total number of men employed at all collieries in the country was 775,706. Some of the latter were employed, of course, at collieries either too uncertain in their future or too small to be regarded as candidates for baths, so it is not clear just how many men should be provided with such facilities.

At the close of 1934, also 21 bathhouses and 2 extensions were in course of erection to accommodate 30,450 men and 104 women, and 18 more baths and one more extension (for, in aggregate, 23,794 men and 96 women) had been planned and the money allocated, but, as with many of the projects on this side of the water, delays in the settlement of deeds and the transference of sites delayed building. One district has requested that as much as 40 per cent of the district funds be allocated to bathhouses. Another district asks that 75 per cent be thus expended.

Percentage of use is based on persons accommodated where fewer are accommodated than the average number employed, and on the number employed where that is less than has been provided for. In 112 installations furnishing figures, the percentage of users in 1934 was 89, whereas in 1931 the figure was 83; in 1932 it was 85, and in 1933 it was 87. Thus there has been progressive improvement year by year.

In Great Britain, workmen have the same difference of opinion as in this country as to the desirability of bathhouses. As here, some miners prefer to carry home the dirt of the mine, possibly partly because they have to dress for the street and change at the bathhouse in the morning, where otherwise one dressing often suffices.

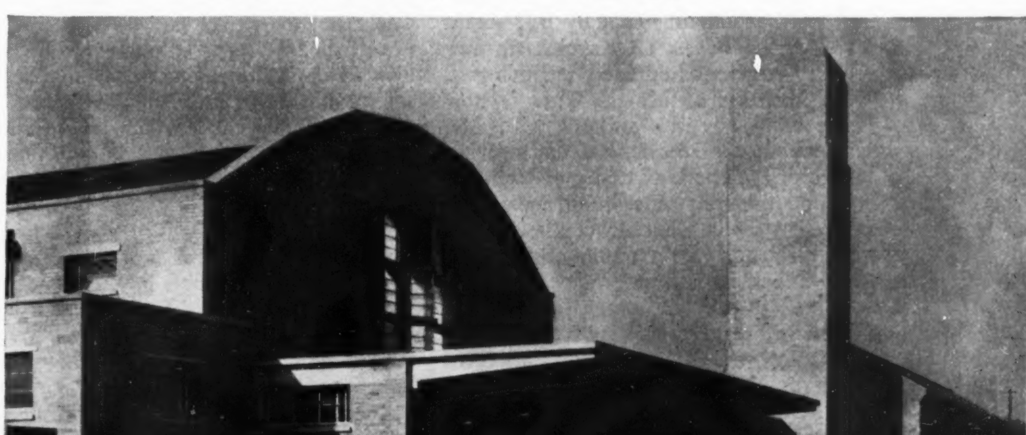
At these British bathhouses the miners pay most, if not all, of the costs of operation and maintenance, as contrasted with the almost invariable practice in the United States under which State laws, where enacted, require the company both to construct and maintain "washhouses," sometimes only if a certain proportion of the men demand it. However, under the Pennsylvania bituminous law, only those who work in wet places must be thus accommodated.

Weekly contributions from the miners for operating 112 of the bathhouses vary from colliery to colliery. At 87.5 per cent of the bathhouses the contribution per week ranges from 6 to 12c., but the upkeep of most installations is partly provided by colliery owners who contribute cash, free coal, steam, electricity or water. One South Yorkshire (England) firm defrays the entire cost of maintaining the baths at two collieries.

Average consumption of water at baths for which figures were received was 8.1 U.S. gal. per bather per day. At installations heated and ventilated by the plenum system driven by electricity, the average coal consumption per bather was 1,176 lb. (or alternatively 7,269 lb. of steam from colliery boilers) and 53 kw. of electricity. At plants heated by steam pipes and radiators, the average consumption per bather per year was 1,333 lb. of coal (or alternatively 7,993 lb. of steam from colliery boilers) and 14.1 kw. of electricity.

An effort has been made to find a way to reduce the cost of smaller plants by eliminating cubicles and arranging showers in one or more groups in a single room. Further reduction of cost by use of pegs for mine clothes instead of lockers, but with lockers for street clothes, has been tried. This, it is believed, will be satisfactory where the men are few and therefore not unknown to one another and less disposed to object to meeting in a common shower room—a cameraderie not infrequent in

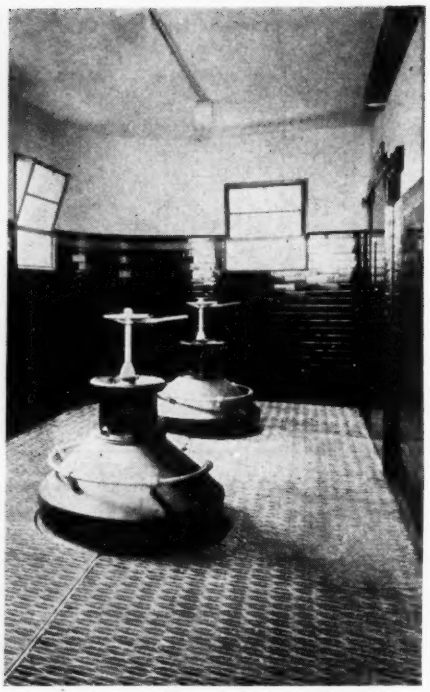
Exterior, Sherwood colliery baths and swimming pool



mines where few men are employed. Lockers provided for street clothes will prevent in a degree the risk of theft. With one scheme the cost of a bathhouse for 200 men is $48.67 per man. Here, steam, water, electricity and a sewer must be available and a larger project must be under construction in the neighborhood so that bulk prices can be obtained. This scheme has a drying room for wet clothes. Another plan for 80 men, with a boiler provided and the boiler room used for drying exceptionally wet garments, keeps the cost down to $62.05, despite the few men involved.

It must not be supposed that bathhouses were introduced in Great Britain solely under the auspices and at the expense of the Miners' Welfare Fund. Prior to 1920, ten bathhouses had been erected at coal mines as a voluntary effort of the operators. In the Coal Mines Act of 1911, it was provided that operators must install bathhouses if a sufficient majority of the workmen favored it and were prepared to pay half the cost of upkeep, but if that total cost were to exceed 6c. per week, the law was not to be enforced. But this figure was even then altogether too low.

Obviously, with limited funds available each year, it was necessary to select the plants at which bathhouses should be erected. For this reason, the central committee drew up district lists of all mines with a probable life of fifteen years, placing first on the list those mines the workmen at which mainly traveled by public conveyances and lived more than a mile from their work, then those subject to only one of those conditions, and finally those subject to neither. Within each of these four groups, wet or hot pits were placed first and the rest in descending order of size.



Boot-greasing and boot-cleaning room, Blackhall baths

Priority lists so drawn were sent to district committees, which were allowed to exercise their option—and this option some took—to substitute lists drawn on some other principle, provided good reason was given for it. About half of them, however, accepted the lists without modification. Special priority, moreover, was given to those companies which were willing to contribute to the capital cost and where district committees were disposed to recommend a contribution to the capital cost from the district fund. But in every case no bathhouse is provided unless the colliery owner is prepared to give a freehold or arrange for a long lease of the site without charge, undertake responsibility for the disposal of baths' waste, and make adequate arrangements with the workmen for the upkeep of the installation.

STEAM-DISTILLED COAL

+ Gives Low-Temperature Coke

In Karrick Carbonization Process

By S. CLARK JACOBSEN
and GEORGE W. CARTER
Salt Lake City, Utah

TO AVOID the emission of smoke from domestic furnaces, a system of carbonizing coal by live steam was devised by L. C. Karrick, former refinery engineer and fuels technologist, U. S. Bureau of Mines. This is now being tested by the authors with Mr. Karrick in the mechanical engineering laboratory of the University of Utah. It is found that not only is an acceptable smokeless coal produced but a gas equal to natural gas and a motor fuel of unusual knockless rating.

When, to prevent combustion, coal is heated in an inert atmosphere the process is known as the carbonization or destructive distillation of coal. When the temperature of this distillation ranges from 900 to 1,200 deg. C. the process is known as high-temperature carbonization. Though the resulting residue, or coke, was formerly used solely for industrial purposes, it has in recent years been extensively burned also in domestic furnaces for the heating of homes. Little volatile matter is retained in the coke, which in the main is a graphitic form of carbon and, therefore, rather difficult to ignite, but with proper sizing, depth of fuel bed, draft regulation, etc., it can be satisfactorily used in furnace-heated homes.

Temperatures for low-temperature carbonization range between 360 and 750 deg. C. By providing this lower heat range, any oils which are formed are not decomposed, and thus the constituents vaporized in the distillation are such as have certain desirable properties which the liquids and gases from high-temperature carbonization lack. Moreover, the semi-coke residue being obtained at lower temperature contains no graphitic material and thus ignites and burns more freely than high-temperature coke. In fact, it burns very satisfactorily in all the usual house-heating appliances and gives high efficiency under the abuses which characterize average home-firing technique.

Mr. Karrick[1] has shown that the element of time is important in controlling the degree of thermal decomposition, or

[1]Karrick, L. C.: "Some Factors Affecting the Yield and Character of Oils From the Distillation of Oil Shales," U. S. B. M., R.I. 2324, 1922.

"cracking," which occurs when carbonaceous substances are distilled at any given temperature. Hence, we believe low-temperature carbonization should be regarded not as a "temperature range" of destructive distillation but as a "condition" under which as little secondary decomposition of the oil vapors as possible will occur, a relatively low yield of high B.t.u. gas will be evolved, and the residue or semi-coke will be a carbon of a readily combustible form.

A small carbonizing plant in accordance with the distilling principles and designs of Mr. Karrick and of capacity which would yield coal products of commercial type was built in the mechanical engineering laboratories of the University of Utah. Dust-free coal was treated in batches by surrounding the coal lumps with an atmosphere of superheated steam at temperatures ranging from 538 to 740 deg. C. The coal retort was a sheet-steel cylinder of 5-in. diameter and 8 ft. long, closed at each end with removable caps. The largest low-temperature carbonizing plants now operating in England are of identical size. The superheated steam, being introduced at the top of the retort, passed down through the coal charge, carrying the distilled volatile constituents from a hot to a cooler zone. This prevented the vapors from being overheated, and the oil condensate which formed on the coal lumps from being refluxed. In consequence, the oils were cracked far less than they would have been if introduced at the bottom of the retort.

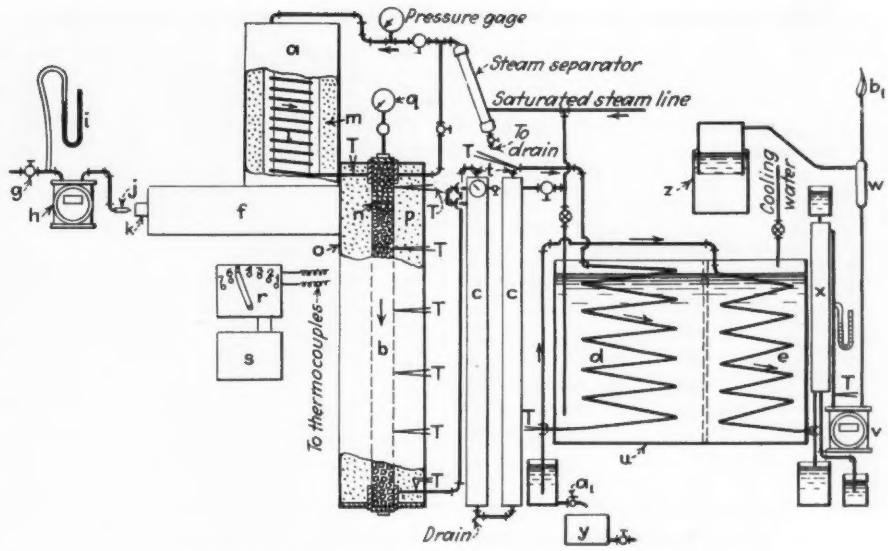


Fig. 1—Schematic sketch of apparatus employed

Three Retorts in One Unit

Later, tests were made at the University of Utah with three retorts as one unit. These consisted of tapered sheet-steel cylinders 10 in. in diameter at the top and 12 in. at the bottom and 10 ft. long, each closed at the ends, as was the smaller retort just described.

The more important parts of the plant are shown schematically in Fig. 1, and comprise superheater, *a;* coal retort, *b;* three fractionating condensers, *c, d* and *e;* condensate decanter, a_1; condensate measuring tank, *y;* gas scrubber, *x;* gas meter, *v;* gas sample storage tank, *z;* and a potentiometer and thermocouples, the positions of the latter being indicated by the letters *T.* A gas-fired furnace, *f,* supplied heat to the superheater and was so placed that the heat could be closely regulated.

The steam condenser *c* removed from the vapor steam the high-boiling oil vapors without condensing any of the water vapor. The oils which boil only at a high temperature and which were found to be slightly heavier than water, being thus removed, the remaining oils and water could be liquefied together in another condenser and thereafter separated from one another by decantation, lighter liquids being removed by overflow. Without such selective methods the separation of the crude oil from the water would have been difficult. A thermocouple to ascertain the temperature was provided at the vapor outlet of this condenser.

Condensers *d* and *e* consisted of two coils replaced in series and occupying separate compartments in the condenser box, *u.* Cooling water flowed in the opposite direction to the vapors being condensed, the condensed liquids from condenser *d* being maintained above 70 deg. F. to prevent any heavier oil that might be present from congealing and obstructing the coils. At the outlet of this condenser a thermocouple was provided so that this temperature might be recorded. The oil-and-water condensate from condenser *d* was drawn off under a liquid seal into the decanter a_1, which was provided with an oil overflow pipe. The water settled to the bottom and was allowed to drain into the tank *y,* which was provided with a water-level tube by which its quantity in pounds could be determined. The more sluggish oils being removed, the remaining vapors and gases from condenser *d* were passed into condenser *e,* which was surrounded by cold water. In this the light oils were condensed and collected in a container with a liquid seal.

The gases that would not condense were then passed up through the scrubbing tower, *x,* where their naphtha fog was removed. This tower was filled with sized gravel over which absorption oil trickled in the opposite direction to the gases. The used oil was drained from the base of the tower, and the naphtha collected from the top. The naphtha-free gases were then passed through meter *v,* provided with a thermocouple and a manometer, and thence through the sampling tube, *w,* to the burner b_1, where they were consumed. A sampling tube diverted about one part in a hundred of the gases into the gas holder, *z.*

Utah coal screened in sizes ranging from 2 in. to ¾ in. was treated in the following manner. The steam supply to the superheater was maintained in such quantity that the pressure at the inlet to the retort was less than 10 lb. per square inch. Superheated steam at temperatures ranging from 538 to 740 deg. C. was passed into the retort until the temperature of the vapors issuing from the bottom of the retort reached 400 deg. C. Destructive distillation begins at approximately 360 deg. C., and experience shows that in this process smokeless fuel will result if the coal is heated with superheated steam to a minimum temperature of 400 deg. C. It also has been shown that if saturated steam is then passed down through the coal charge, the heat contained in the upper portion of the coal will superheat the steam and complete the distillation of the lower portion. Thus the saturated steam cools (or dry-quenches) the top of the charge, absorbs this residual heat and thereby carries the distillation to the bottom of the retort, and, finally, at the end of this dry-quenching period, leaves the coal at a temperature so low that it will not take fire when discharged. Table I is a summary of the results obtained with various Utah and Wyoming coals.

Fig. 2 shows clearly that the temperature of the lower zone of the retort, indicated by thermocouples *4, 5, 6* and *7* (Fig. 1), did not begin to rise above 100 deg. C. for some 15 or 20 minutes after the distillation was begun. This temperature lag is produced by the presence of water in the coal. As soon, however, as the moisture has evaporated, the temperature rises rapidly, and as the coal begins to distill, the rate of temperature rise is aided by the exothermic property of Utah coals.

It has been shown by Burke[3] that this exothermic heat is 37 to 59 B.t.u. per pound of coal, and in this process this

[3]Burke, S. P.; Parry, V. F.: "The Heat of Distillation of Coal." *Ind. & Eng. Chemistry,* Vol. 19, p. 15, 1927.

Table I—Summary of Results Obtained by Low-Temperature Carbonization

Coal	Pounds smokeless fuel per ton coal	Cu.ft. gas per ton coal at test conditions	Pounds crude oil per ton coal	Gas analysis—per cent by volume at 60 deg. F. and 30 in. Hg: CO_2	Ill.*	CO	H_2	CH_4	C_2H_6	B.t.u. per cu.ft.
Sub-Bituminous										
Grass Creek	1106	3100	201	26.0	7.6	15.5	9.4	32.7	9.4	805
Weber	1130	3350	201	....	....	....	....	....	....	....
Weber	1200	3135	186	....	....	....	....	....	....	....
Lazert	1133	3380	138	33.8	4.2	15.5	13.1	29.6	3.5	578
Bituminous										
Castle Gate No. 2 Mine—"D" Seam	1400	2630	239	....	....	....	....	....	....	....
Castle Gate No. 3 Mine—"F" Seam.	1361	2540	253	....	....	....	....	....	....	....
Clearcreek	1326	2660	249	....	....	....	....	....	....	....
King	1308	2475	285	14.9	9.2	9.7	16.7	40.0	7.7	901
King	1277	2185	286	....	....	....	....	....	....	....
Aberdeen	1358	3260	283	....	....	....	....	....	....	....
Aberdeen	....	2885	259	....	....	....	....	....	....	....
Standard	1370	2690	275	15.8	14.6	11.3	5.7	52.8	....	1018
Sevier Valley	1231	2760	275	18.3	8.4	10.7	16.8	36.0	9.6	876
Rilda Canyon	1277	2135	319	....	....	....	....	....	....	....
Rock Springs	1288	2540	221	....	....	....	....	....	....	....
Kemmmerer—Susie	1420	2700	202	13.2	9.5	8.4	19.8	41.5	8.7	951
Kemmmerer—Susie	1366	2900	197	....	....	....	....	....	....	....
Sevier Valley	1300	3110	269	19.0	7.75	10.9	21.6	35.3	5.43	789

*Ill.—Illuminants.

Table II—Yields of Oil Products

Product	Per cent of crude	Gal. per ton of coal
Gasoline	18.0	5.85
Kerosene	18.0	5.85
Fuel Oil	20.0	6.40
Cresylic Acid	3.1	1.00

Table III—Proximate Analyses of Raw Coal and Smokeless Fuel

Fuel	Steam Temp.	Per Cent by Weight: Moisture	Volatiles	Fixed Carbon	Ash	Sulphur	B.t.u.
Raw Coal	...	3.2	39.7	50.8	6.3	0.53	13,300
Smokeless Fuel	538	...	17.0	75.9	7.1	0.55	12,900
	650	...	17.5	74.1	8.4	0.45	13,000
	740	...	14.0	77.0	9.0	0.40	13,000

heat forms part of the useful (distilling) heat of the superheated steam. Fig. 2 shows the temperature curves crossing each other during the dry-quenching period because of the heat exchange taking place in the coal charge.

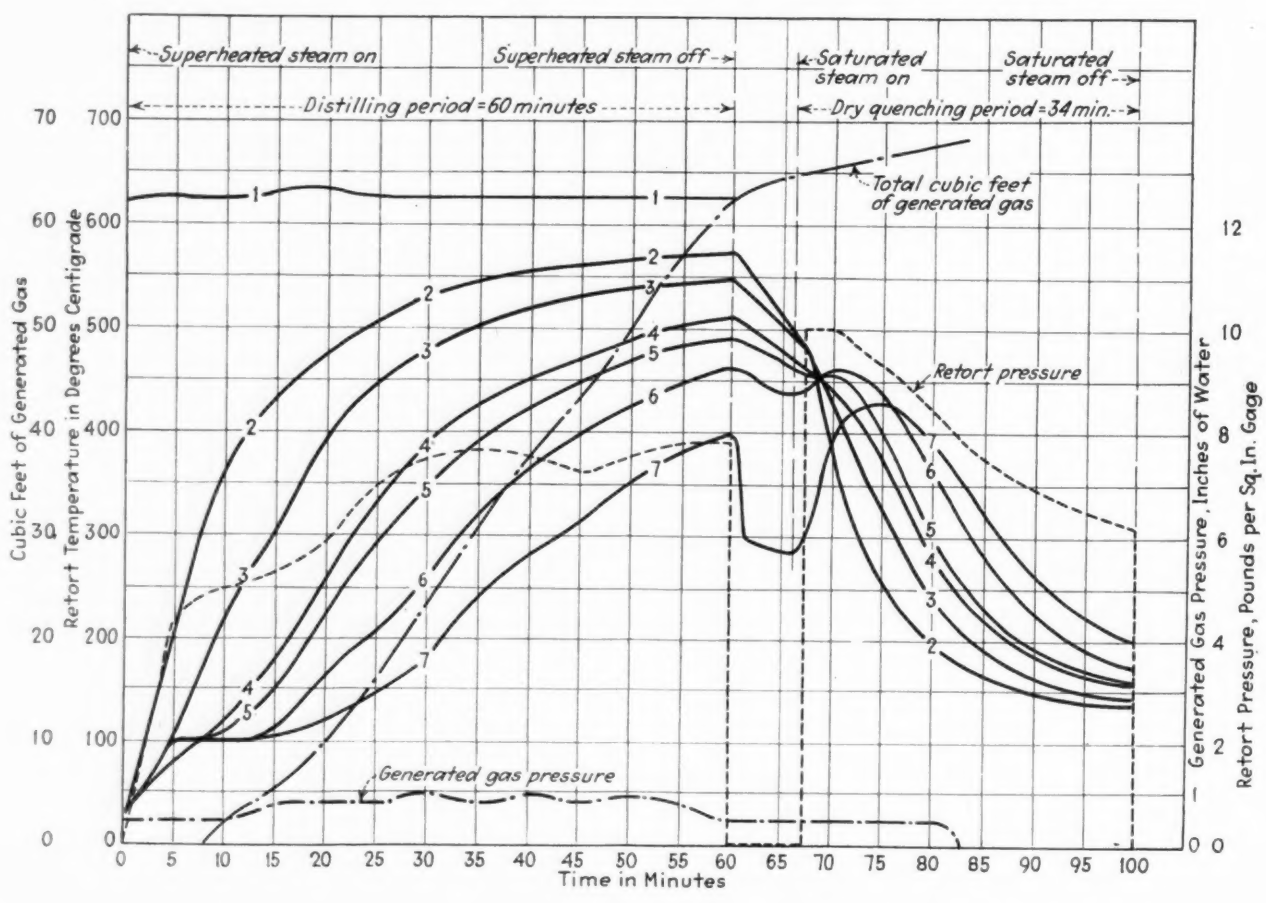
One of the unusual features of this method of treating Utah coal is in the transference of this "high-temperature" heat from the upper part of the coal charge to the lower. Thereby useful work is accomplished, and the quantity of steam and the superheating required also are reduced.

It was found that by the use of three retorts as a unit, the operation of the plant could be made continuous, for, while one retort charge was being distilled, another one could be preheated to distilling temperature, and the third retort cooled to discharge temperature. With proper manipulation of the vapors discharged from one retort to preheat another, important steam economies can be effected.

The effect of controlled pressure on the lumps of coal as they are being distilled is further shown in Fig 3. On the left are lumps of raw coal. In the center of the illustration are coal lumps of the same size which have been distilled without the requisite external pressure. It will be noted that these lumps contain expansion cracks, are friable and of low density. On the right is shown the usual type of smokeless fuel product obtained in our processing studies. The lumps are hard, dense, free from expansion cracks, and form an attractive solid smokeless fuel.

Yields of smokeless fuel, oil and gas and also heating value of gas varied with every change of distillation temperature, as may be noted in Fig. 4. Yield of semi-coke decreased and gas yield increased in every instance with increase of distillation temperature. With greater gas yields, however, the

No. 2—Record of plant operation—Temperature curves of retort thermocouples and curve of gas pressure



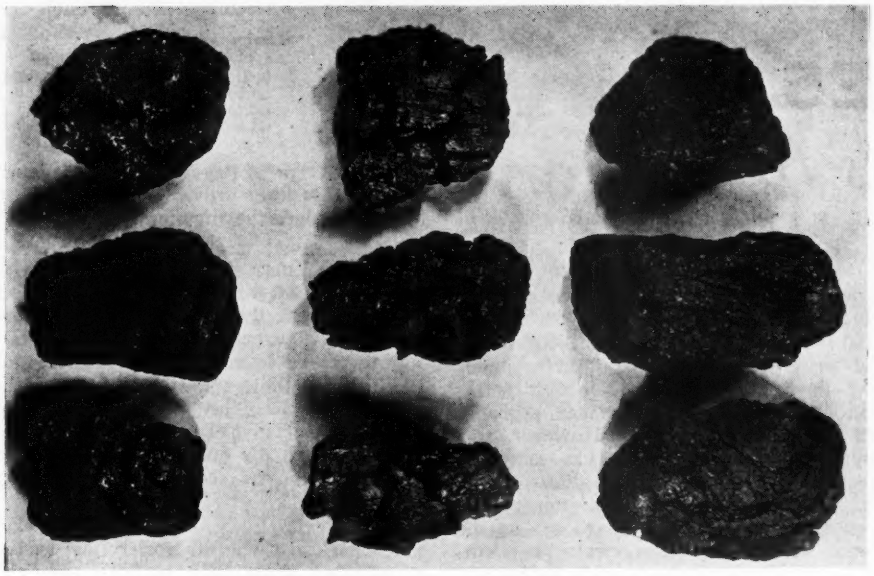


Fig. 3—How controlled pressure solidifies the smokeless fuel

heat value of gas decreased. Some water gas was produced, but little gas was formed from the cracking of the oils in the vapor phase, so the increased yield was due to removal of residual volatiles from the semi-coke. At 650 deg. C. the crude oil yield reached a peak, but, because of vapor-phase cracking, it had a smaller value at 730 deg. C. than at 540 deg. C. A distillation temperature of 650 deg. C. gives the best results, as the curves clearly show.

Characteristics of Byproduct Oil

Present-day improvements in the technology of oil cracking and refining are so extensive that we took data to determine the possibilities of refining the coal oils into the most common petroleum products. Though gasoline was the principal oil product sought, kerosene, fuel oil, fuel gas, and cresylic acid also were produced and measured.

The crude oil is solid at room temperatures because of the high content of waxes, resins, and high-boiling hydrocarbons. In the previous low-temperature carbonization investigations by L. C. Karrick, it was shown that this crude oil is approximately 35 per cent unsaturated, 30 per cent naphthenic, 20 per cent aromatic, and 15 per cent paraffin hydrocarbons. It has been further shown that the paraffin wax is of "superior grade as compared with commercial petroleum wax, as it has a higher melting point and is relatively dry wax."

About 110 lb. of carbon (ashless coke) and 850 cu.ft. of 1,350 B.t.u. gas were produced per barrel of crude oil cracked. The pressure distillate was fractionated at 205 and 253 deg. C. at 640-mm. pressure, thereby forming three fractions, gasoline, kerosene, and fuel oil. After the tar acids were removed, 18 per cent of light yellow gasoline was obtained which was color-stable, non-gum-forming, and of the proper volatility for motor use. The gasoline from Utah coals possesses distinct anti-knock properties. Samples tested in a standard octane-rating machine of the American Society for Testing Materials gave a rating of over 100 octane. Previous cracking and refining studies gave 30 per cent gasoline with anti-knock value of 65-per-cent benzol in straight distilled paraffin gasoline.

The yields of the oil products were as recorded in Table II.

Table III gives the proximate analyses of the raw bituminous coal and the corresponding smokeless fuel obtained at the three carbonization temperatures, viz: 538, 650, and 740 deg. C.

A series of tests made in standard house-heating appliances showed that the semi-coke would ignite easily and burn readily. These tests were made in a hot-blast heating stove and a cooking range similar to those used in the average home. An open fireplace also was provided, and all the operation of all three units was observed, using the necessary instruments to measure draft, flue-gas temperatures, smoke and fly-ash in the gases, and to make gas samples. In a series of heating studies efforts were made to reproduce precisely the average condition of firing in the home. In heating and cook stoves, semi-coke gave 1.15 times, and in the fireplace nearly three times as much heat as raw coal. Moreover, the gases of raw coal produced more than 100 times as much soot, tar, carbon, and ash as were collected from the burning of the semi-coke. The semi-coke also responded readily to draft changes and burned without observable smoke.

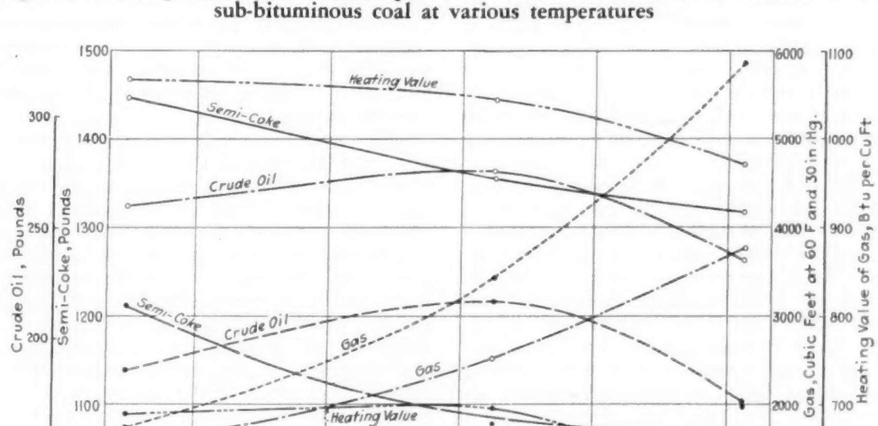
Results of our studies of the Karrick method for the heat-treatment of Utah coals definitely show that the raw coal can be easily and economically converted into several useful and popular fuels. The most important of these are: (1) solid smokeless fuel, (2) artificial gas having a heating value equal to that of natural gas, and (3) crude oil from which high-octane gasoline can be made. The cost of treating one ton of coal to obtain these three products ranges from $1 to $1.25.

No one can deny that the use of these developments would more efficiently utilize and conserve our coal resources. It is to be hoped that soon the predictions of Mr. Wadleigh[3] will come true, namely, that:

"The time may come, and is coming, when no bituminous coal will be burned in its raw state. Leading chemists and engineers have many times expressed the opinion that the use of coal 'as is' should not and will not be tolerated much longer; that such use is an economic waste of our raw material that is sure to be eliminated in the not-too-distant future, when we have reached the full realization of the age-old maxim, that waste makes want."

[3]Wadleigh, F. R.: "The Need for Coal Research," A.S.M.E. Trans. Vol. 50, Fuels and Steam Power, 50-53.

Fig. 4—Low-temperature carbonization products from one ton of Utah bituminous and sub-bituminous coal at various temperatures



NOTES
From Across the Sea

MORE and more, silicosis is being recognized as a cause of disease rather than a disease in itself. It is, so to speak, a hazard rather than an injury. Unfortunately, it is a hazard that slowly, if at all, corrects itself. But now a different theory is advanced: that ordinary lung diseases may predispose individuals to silicosis, much as nitrous-oxide concentrations are believed to do.

Addressing the North Staffordshire Institute of Mining Engineers, D. T. Jones described the lung troubles attributed to silicosis in the anthracite mines of South Wales. He declared that in these mines no rock dust is used to prevent explosions of coal dust, and the strata contain less rather than more free silica than the strata in the other coal fields of South Wales. Less dust is carried by the air in the mine airways than in those where rock dust is used. But more explosives are used during working hours at the coal face, and miners travel to their work on man trips, most of which enter the mines from the surface by long inclines which in the winter are traversed by chilly intake air at a velocity of 1,500 to 2,000 ft. per minute. This chills the men as they leave the mines and makes them subject to bronchitis.

Of 53 anthracite collieries, 29 with 14,534 workers used inclined man trips and 22 with 9,540 workers did not. Up to the end of 1934, the collieries using inclined man trips had 435 claims for silicosis, 331 of which were certified, whereas those which had none had only 52 claims, 37 of which were certified. These figures indicated to Dr. Jones that the apparent harm attributed to the dust in anthracite mines was in reality dependent on bronchitis resulting from exposure to the cold air while riding on inclined man trips.

Coal dust accumulated in the lungs because bronchitis paralyzed these organs and prevented them from throwing off the dust. In this case it would seem the disease should rather, one would think, be termed anthracosis than silicosis. Dr. Jones suggested moving the man trips over to returns and that where intakes continued to be used the cars be protected by hoods or the miners themselves be protected by wearing cowls.

All this suggests that lung disease of every kind would be greatly decreased if proper care were taken in cold weather to provide that the men on leaving the mines be protected against the rigors of the winter until the perspiration due to the work and heat of the mines is removed and until their enlarged pores become closed. Lung diseases seem to be mutually related. Silicosis appears to invite tuberculosis and bronchitis, and the latter to invite anthracosis and perhaps silicosis. Persons who are unhealthy—that is, who are not functioning properly—are more likely to succumb to any form of disease. So interdependent are these lung diseases that it would be difficult to determine which is cause and which effect.

In this country the shift from long slopes and drifts to shafts at anthracite mines may have been beneficial, though better ventilation of the working face probably has been a greater gain. However, this improvement of ventilation has increased the velocity and chilliness of shafts, slopes and drifts, exposing the miners to bronchitis. Warm waiting rooms at the shafts and warm passageways to bathhouses are further helps toward better conditions.

Addressing the (British) Institution of Mining and Metallurgy, R. S. G. Stokes, discussing recent developments in mining practice on the Witwatersrand, said: "To promote a still further reduction in the incidence of all pulmonary diseases, tests have been conducted on a few mines to ascertain if benefits could be obtained from the issue of sheepskin or serge jackets or woolen jerseys to underground workers. Serge jackets were found the most satisfactory and have this winter been issued to all natives underground and to surface workers." Direct reference was not made to silicosis in this connection, and the fact that surface workers are included leads to the inference that the protection was not to prevent silicosis but other pulmonary diseases, such as pneumonia. However, it may be intended for protection of workers in mill dust.

"The erection of shelters at shaft head for natives awaiting the cage," says Mr. Stokes, "has become general practice, when the compound is at any distance." Yet the Witwatersrand never has winter weather of any great severity, the temperature only reaching the freezing point at night. On the other hand, the temperatures in working places may be 103 deg. F., according to A. V. Lange, in discussing a paper before the Chemical, Metallurgical and Mining Society of South Africa. Before leaving their work for the main intakes, men in these hot places need to remove all clothing above the waist, if any, and put on warm, dry clothes. Whatever the cause for the precautions taken—whether against pneumonia or silicosis, and they seem to have been taken against the former—the provisions would seem likely to reduce the silicotic tendency.

Table I—Arsenic in British Fuels

Fuel	Grains per Lb. of Fuel	Percentage
Coal	0.21 to 2.9	0.002999 to 0.04128
Anthracite	nil to 0.13	nil to 0.00186
Gas coke	nil to 0.52	nil to 0.00743
Lignite	nil to 14.0	nil to 0.20000

WHEN malt is heated in contact with the gases from burning coal it is important that the volatile arsenic in the coal be in low percentage. It is interesting therefore to compare the figures for British with those for United States coal. Brame and King, in "Fuel, Solid, Liquid and Gaseous," give Table I, to which has been appended the final column converting the figures in the second column to percentages.

In contrast, E. S. Hertzog, addressing the American Chemical Society last spring (*Coal Age*, June, 1935, p. 279), gave the percentages of arsenic as arsenic trioxide, which may be expressed as in Table II.

Table II—Percentages of Arsenic in United States Bituminous Coal

Bed	State	Fixed Arsenic	Volatile Arsenic	Total Arsenic
Wadge	Colo	Trace	0.00007	0.00007
Black Creek	Ala	0.00030	0.00000	0.00030
Corona	Ala	0.00052	0.00000	0.00052
Alma	W. Va	0.00038	0.00022	0.00060
Bear Creek	Mont	0.00030	0.00037	0.00067
Pittsburgh	W. Va	0.00052	0.00023	0.00075
Pittsburgh	Pa	0.00067	0.00030	0.00097
No. 6	Ill	0.00052	0.00045	0.00097
Weir-Pittsburg	Kan	0.00052	0.00052	0.00105
Mary Lee	Ala	0.00112	0.00000	0.00112
No. 9	Ky. (West)	0.00060	0.00052	0.00112
Lexington	Mo	0.00075	0.00052	0.00127
No. 3	Iowa	0.00075	0.00082	0.00157
Jefferson	Ala	0.00985	0.00075	0.01060
Average	Ala	0.00120	0.00034	0.00154
Average excl'g last		0.00054	0.00031	0.00085

Only the volatile portion of the arsenic is harmful. But, as these percentages are not available in regard to the British coals, only the total arsenic can be compared. Excluding the high percentage of the last coal recorded, the bituminous coal of the United States compares well with the anthracite of Great Britain and all the analyses lie below those of any of the bituminous coals of that country. McGowan and Floris, declares the British publication, gave 23 analyses of anthracite for fixed and volatile arsenic; the average fixed arsenic amounted to 0.000415 per cent per pound of fuel, the volatile arsenic to 0.000200 per cent, which would show that the average bituminous coal in the United States is not quite as free from volatile arsenic as the average British anthracite, though some American bituminous coal is entirely free of that volatile constituent. Thus far, American anthracites do not seem to have been tested, but if they were, the results might be quite favorable, as the percentage of volatile arsenic, despite some exceptions, seems, in the United States, to decrease with rank, which is what might be expected.

Apparently the British figures in Table I do not include analyses that have abnormally high or low arsenic, the book quoted declaring "their use at the time of publication [of such figures] being solely to establish the dangerous or innocuous nature of the fuel concerned in malting practice."

R. Dawson Hall

On the
ENGINEER'S BOOK SHELF

Requests for U. S. Bureau of Mines publications should be sent to Superintendent of Documents, Government Printing Office, Washington, D. C., accompanied by cash or money order; stamps and personal checks not accepted. Where no price is appended in the notice of a publication of the U. S. Bureau of Mines, application should be directed to that Bureau. Orders for other books and pamphlets reviewed in this department should be addressed to the individual publishers, as shown, whose name and address in each case is in the review notice.

Review of Literature on Effects of Breathing Dusts With Special Reference to Silicosis. Part III-A: Economic and Legal Aspects of Dust Disease in Industry, by D. Harrington and S. J. Davenport, U. S. Bureau of Mines. Information Circular 6857; mimeograph, 58 pp.

"A very important economic hazard is menacing industry, even to the extent in some instances of threatening its very existence," declare the authors, substantiating this statement by many references to suits being brought for compensation by persons alleging incapacities from dust diseases, sometimes for sums greatly in excess of those obtainable under the compensation law. Many of these suits are the results of the activity of shyster lawyers and are brought against the companies most able to pay the sums sought, rather than against those which have less funds yet have the worst conditions and have employed the plaintiffs for periods longer than those plants wherein the plaintiffs allege they incurred the disability.

Court opinion and decision in the case of the Pennsylvania Pulverizing Co. is reported at much length, also the "Standards for Safety and Health for the Crushed Stone, Sand and Gravel, and Slag Industries," approved by the National Industrial Recovery Board, Dec. 7, 1934.

Silicosis and related diseases—though their causes, characteristics, diagnoses and effects have been vigorously debated by authorities who have made the subjects a matter of exclusive, or almost exclusive, study for a decade or more—are far from being understood. This is true of many other diseases, but it is distinctly unfortunate that under these circumstances such matters should have to enter the courts for determination by judges and juries, especially as prevention, though better understood than ever before, by no means has been clarified sufficiently.

The Compleat Collier: or the Whole Art of Sinking, Getting, and Working Coal Mines, as Is Now Used in the Northern Parts, Especially About Sunderland and New-Castle, by J. C. 55 pp., 4¾x7⅜; paper. E. McAuliffe, Omaha, Neb. Private circulation.

The original, which this pamphlet reproduces in lithographed form, was printed for G. Conyers at the Ring in Little-Brittain, London, in 1708. The republication is accompanied by a short introduction, glossary and translations of the Latin quotations with which the original is besprinkled. Firedamp, or "Surfet," is described as "another dangerous sort of bad Air, but of a fiery Nature like Lightning, which blasts and tears all before it, if it takes hold of the Candle, which an experienced Labourer will discover and extinguish, tho' it be going to take at his Candle and can sometimes smell to be Dangerous or hurtful, therefore all Sinkers should be skilled in these Matters for their own Security sake." Blackdamp is "Styth, which is a sort of bad foul Air or Fume exhaling out of some Minerals or partings of Stone . . . and here an Ignorant Man is Cheated of his Life Insencibly."

Flame-Arresting Limitations of Flat Joints and Plain Bearings in Explosion-Proof Mine Equipment, by G. R. Gleim and R. S. James, U. S. Bureau of Mines. Technical Paper 566; 26 pp.; paper. Price, 5c.

In the interest of safety, the U. S. Bureau of Mines has insisted that all permissible machinery be absolutely flameproof. Not all the flames escaping from an ignition of gas in an inclosure will ignite an explosive mixture of methane on the exterior of the machine, but the Bureau has been unwilling to approve any equipment that emitted flame, because it could not feel assured that an inclosure which one day would emit relatively harmless flames would the next day emit flames equally attenuated, because meantime metal chips, dirt or like bodies might have prevented the inclosure from being sealed as adequately as at the time of test or as completely as in some other machine tested, thus permitting dangerous flames to emerge.

Tests made with a cutting-machine rheostat inclosure, with 8.6 per cent of methane therein, passed sparks through a 0.005-in. opening, emitted flame through a 0.060-in. opening and ignited a methane-air mixture externally through an opening of the same size. Note that in this case a flame which would pass through a 0.060-in. opening will, or at least may, ignite gas. A 7-per-cent mixture of methane and air in an inclosure passed its first sparks through a 0.005-in. opening and its first flame through a 0.007-in. opening and first ignited gas through a 0.087-in. opening. Another test with 10.6-per-cent gas suggests to the reviewer, with the first of those cited, that most flames from high percentages of methane will ignite exterior gas if and when they reach it.

Investigation showed that an opening of about 0.006 in. permitted the discharge of flame, but such flame was not of sufficient duration or temperature to ignite the surrounding explosive atmosphere under the test conditions where methane or petroleum ether was used. In Europe, an opening of as much as 0.02 in. has been regarded as safe, but if so large an opening is permitted, how can one be sure that it will not be exceeded, because moisture, dust and grease find their way only too readily into such compartments. Besides, bolts loosen and flanges part, especially under the violence of an explosion.

Moreover, the reviewer would add, machines get heated by repeated explosions and slower ignitions, as also in other ways, and cold tests are hardly determinative of what may happen under heat. Perhaps experiments already have been made with an extinctive gas fed to the inclosure from a gas tank. This, by excluding oxygen, might prevent the formation of nitric acid, which destroys parts of the equipment; it also would cool the machine, which is a distinct desideratum, but possibly there might be disadvantages and high costs in such procedure.—R. DAWSON HALL.

Statistical Appendix to Minerals Yearbook, 1934, by O. E. Kiessling. U. S. Bureau of Mines, Washington, D. C. 434 pp., 5⅞x9¼ in.; cloth. Price, $1.

In 1933, declares this publication, coal supplied 10,089 trillions, or 52.2 per cent, of heat units out of 19,317 trillion supplied from mineral fuels and water power. Average working time in bituminous mines in 1933 was 166 days and output per man-day was 5.37 tons; 25 days were lost by strikes. Eighty per cent of the coal was mined by machines, 9.3 per cent was reported as mined by hand, 5.1 per cent was shot off the solid, 5.5 was stripped and 0.1 was produced by unspecified methods.

Of coal-cutting machines, 5,354 out of 11,845 were permissible. Illinois led in stripping, with Indiana a close second; Kansas trailed as a somewhat weak third, followed by North Dakota and Ohio. In all the bituminous area there were 289 strip pits with 169 steam shovels, 117 electric shovels and 103 other shovels. There were still 69 horse-stripping operations.

Imports totaled 202,621 tons; exports, 9,037,000 tons, in 1933. About 30 per cent of the entire production of the world in that year came from the United States. Montana led in production per man per day in 1933 with 9.80 tons per man, with North Carolina at the tail end with 1.15 tons per man. Alaska as a producer is declining slowly, producing only 96,467 tons in 1933 while consuming 132,000 tons, of which about 10 per cent came from Canada and 16 per cent from Washington State.

Of the coal shipped in the anthracite region in 1933, 96.41 per cent came from breakers, 2.84 per cent from washers, and 0.74 per cent from dredges. Bootleg coal, of course, receives no recognition in the report. Today, at least, its tonnage is much larger than that from washers or dredges, or both combined. Strip shovels in the anthracite region totaled 319, of which 131 were gasoline, 74 were steam, and 71 electric, and 43 were of other types.

OPERATING IDEAS

From Production, Electrical and Mechanical Men

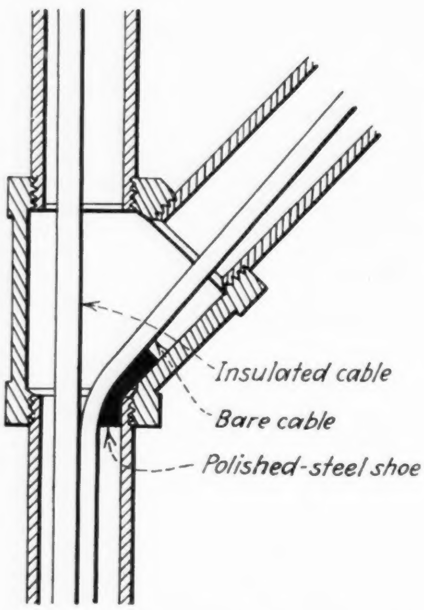
Largest and Longest Cable Supported by Conductor

In 1935 the Pond Creek Pocahontas Co. put into service at No. 4 mine, Raysal, McDowell County, W. Va., a "1½-million" insulated borehole cable which is outstanding in the coal industry in that it is the longest cable of that size and type installed in a borehole and supported entirely by the copper conductor.

Pursuing a general policy of limiting 250-volt d.c. distribution to 1½ miles, it became necessary to install a new substation at a point where the cover over the coal is 836 ft. Because an outside substation was considered preferable for the conditions, the job entailed installing a d.c. feeder circuit in a borehole. The forecast load for that section of the mine called for a 300-kw. conversion unit, and efficient distribution dictated 1,500,000-circ.mil positive and negative feeders to the branch feeder point down inside of the mine.

Single-conductor insulated cable of the following specifications was selected for the positive leg: 1,500,000-circ.mil, 91 strands of tinned copper, 8/64-in. wall of 60-per-cent Anhydrex low-water-absorbing rubber, heavy rubber-filled tape, one weatherproof braid over all, approximate outside diameter 1 52/64 in., suitable for 600 volts; net weight per 1,000 ft., 5,317 lb. For the negative conductor, standard practice was followed in that a bare cable is used.

Clamps on the conductors support these two 1,500,000-circ.mil cables in the 836-ft. borehole. The negative cable, at the right, is installed in a trench from the base of the pole to the substation, which is 20 ft. from the pole

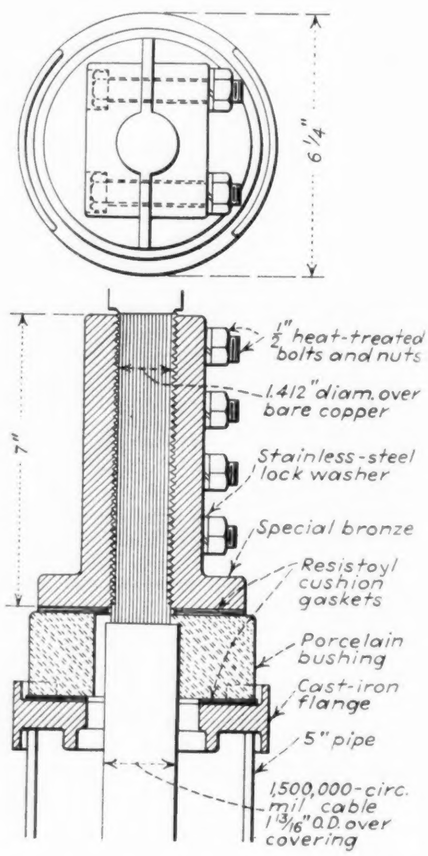


A polished shoe provides a long-radius contact bearing for the bare cable in the lateral fitting at the top of the casing

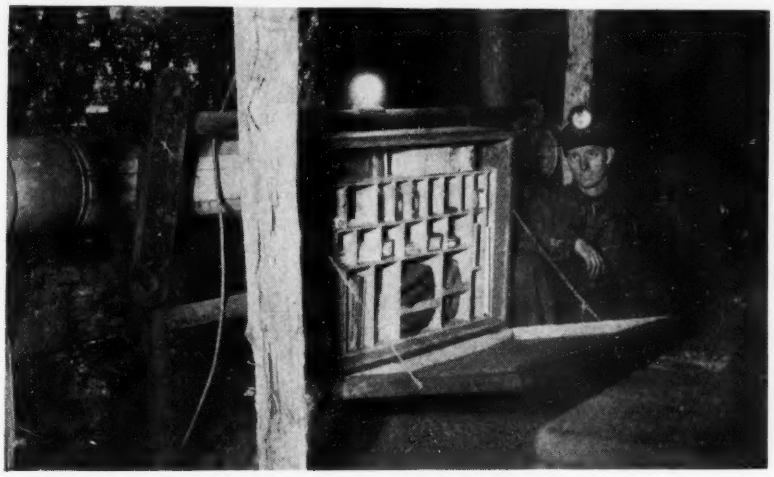
A 5-in. casing was selected as the size to contain the two conductors and this casing was grouted into the borehole, which was drilled to an 8-in. diameter. The arrangement at the top of the borehole is unusual in that a 45-deg. lateral is installed so that the positive cable is supported by a clamp resting on top of the vertical, or straight, terminal of the casing and the negative is supported by a similar clamp resting on the end of the lateral branch. This branching point of the casing is cast into a concrete pier at the top of the borehole.

Both cables were lowered into the hole from the top, and, to facilitate installation of the bare negative through the lateral without damaging the strands on the inside corner, this fitting was modified by inserting a polished steel shoe against which the cable rests at the angle.

Insulated cable supports, alike for both conductors, were supplied by the G. & W. Electric Specialty Co. These consist of non-corrosive clamps designed to an exact fit over the 1,500,000-circ.mil copper and insulated from the casing cap by a padded porcelain bushing. The insulated positive cable was manufactured by the Simplex Wire & Cable Co.



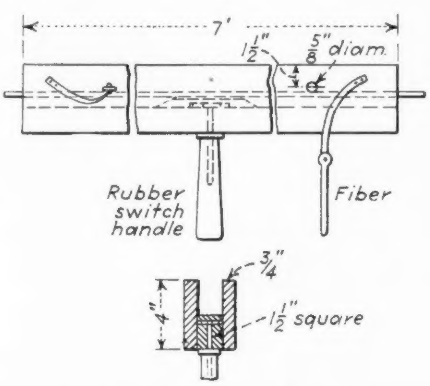
Two and one-quarter tons of insulated cable is supported by this threaded-grip clamp. A similar clamp supports the bare negative cable



Portability features this first-aid kit

Portable Guards Protect Men Working Under Trolley

To safeguard track cleaners and other men who find it necessary to work under trolley wires, the portable guard shown in the accompanying illustration has been adopted at the Beech Bottom mine of the Windsor Power House Coal Co., Windsor Heights, W. Va. The guard is constructed



Details of portable trolley guard

of wood with a rubber switch handle, and is suspended on the wire by two fiber pins. As the man moves along, the guard is slid along in step. When hangers are encountered, a pin is removed, the guard is slid along past the hanger and the pin again inserted. Standard length of guards for straight wire is 7 ft. Shorter guards are used on curves and larger sizes are employed on feeders.

First-Aid Kits Are Portable

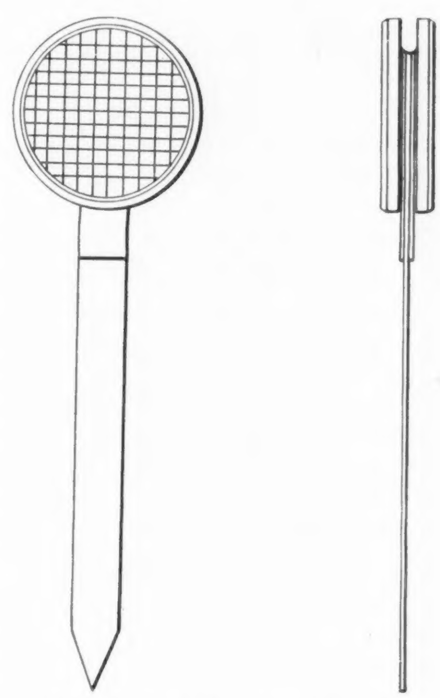
Portability is considered an essential factor in first-aid-kit design at a northern Indiana mechanical-loading mine because each panel of rooms lasts only about three months under the concentrated mining plan in use. In the kit employed, the box for materials and the canister containing the stretcher and blankets are supported on an electric-arc-welded portable pipe framework which is wired and fitted with a green light for identification, as shown in the accompanying illustration. A complete set of splints, not shown in this view, also are supported on the framework, as a rule. The illustration does include, however, a stiff hitching, which is employed instead of the standard three-link hitching, to lessen shock when a man has to be transported out of the mine in a car.

In addition to the green identification light, other lights are installed inside the canister and material box to prevent damage to the materials by moisture, as the mine is very wet. The boxes are kept locked, with keys in possession of all foremen and certain workmen well versed in first-aid. However, the padlock is so arranged that it can be knocked off with a blow in case a man is injured and a key carrier is not in the vicinity. So far, this has not occurred. The box is practically airtight when closed, and a standard list of material, as approved by the State mining department and the U. S. Bureau of Mines, is kept in each kit.

Reflectors Make Trip Flag

To decrease operating cost and at the same time provide a trip marker with all the advantages of the open flare, automobile trailer reflectors are employed at the No. 3 mine of the Illinois Zinc Co., Peru, Ill. Originally, the open flare was used at this operation and, according to K. N. Banthin, engineer, allowed the motorman to determine whether or not his trip was intact by looking back to the flare on the rear car and at the same time enabled a man walking along the main haulway to see the last car. Smoke and the possibility of fire, however, led to the abandonment of the open flare, after which battery-type trip lamps were tried out. Electric lamps, however, proved costly to maintain and did not allow the motorman to observe his trip.

In a search for a trip flag which would have the advantages of the open flare without its disadvantages, two reflectors of the yellow-color type used on the sides of automobile trailers were purchased and assembled back to back on an iron pin as shown in the accompanying illustration. The pin is shoved down into the coal in the last car with one reflector facing forward and the other to the rear. Light from the motorman's carbide lamp is sufficient to light up the front reflector across sixteen cars, while the rear reflector picks up the light from the lamp of anyone walking along the entry. The flag has met with the approval of the motorman at the mine, and operating expense, as well as replacement cost, have been cut to practically nothing.



Details of trip flag with reflectors

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Files

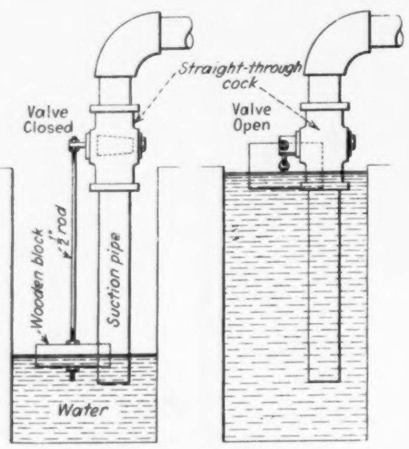
● The term "file" refers to a number of activities and subjects, including repositories for material or information to be preserved for future reference. Thus, a man may carry a file of information in his head or may preserve notes in a drawer, but in each case the object is the same— creation of a reservoir of information on which he can draw in time of need. Items in these pages are designed for inclusion in the files of operating, mechanical, electrical and safety men around the mines, who also in turn develop the information here presented. If you have a cost-cutting, efficiency-promoting or time-saving idea, send it in, together with a sketch or photograph if either will make it clearer. Acceptable ideas are paid for at the rate of $5 or more each.

★ ★

Suction Control

Where there are a number of sumps on one suction line, writes Thomas James, Knox Consolidated Coal Corporation, Bicknell, Ind., the sump nearest the pump goes dry first and then the others, with the result that the pumper is kept busy opening and closing valves. To eliminate this condition, Mr. James calls attention to the suction control shown in the illustration.

To make the control effective, a common



Suction control in high- and low-water positions

straight-through cock is installed on the suction pipe at each sump. Brass cocks are preferable, as they do not corrode and turn easily when well greased. The control itself consists of a brass rod and a wooden block made of a piece of tie or 2x4. The rod is cut to the right length and bent to suit the conditions at each sump, which can be found by a little experimentation. One end of the rod is fastened in the hole in the valve key and the wooden block is bolted to the other. As the water in the sump rises it lifts the block and opens the valve. Conversely, as the water is pumped down, the block drops and closes the valve. The block may be painted or otherwise treated to keep out water.

Combination Gate and Chute Regulates Flow From Bin

Combination bin gates and loading chutes are installed on strip-coal pockets at the Lansford breaker of the Lehigh Navigation Coal Co. The pockets in question are used to transfer mine-run received from the Summit Hill stripping in railroad cars to mine cars which can be handled by the car hauls on the inclines leading up to the dumps in the top of the breaker. Gate and chute are assembled into a single unit, with the chute coming off at the top of the gate section (Fig. 1). The unit operates in guides to permit upward and downward movement and also to hold the gate against the thrust of the coal. Heavy guides are required for the latter reason.

Opening and closing of the gate are controlled by a steam cylinder and counter-

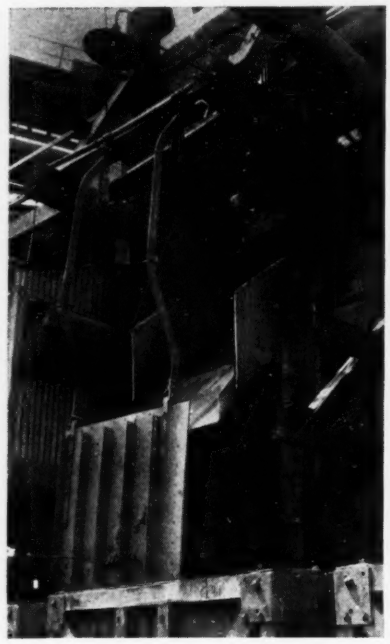


Fig. 1 — Gate in closed position, showing method of attaching chute

Fig. 2—Gate fully opened by action of piston rod against counterweights

weights. Piston rods and counterweight ropes are attached to a steel cross member from which the gate and chute are suspended. The cross member also operates in guides. Counterweights are arranged so that the gate is normally held in the closed position. To open the gate, steam is admitted to the cylinder, driving down the piston against the pull of the counterweights. Depending upon the position of the throttle, the gate may be fully or partly open. Also, by appropriate movement of the steam-control lever it is possible to alter the position of the gate rapidly and continuously in accordance with the condition of flow desired.

Working Hints From a Shopman's Notebook; Welding Gathering-Arm-Disk Shafts

By **WALTER BAUM**
Master Mechanic, Perry Coal Co.
O'Fallon, Ill.

FOR holding broken and new shafts in place for welding on the gathering-arm disks of Joy 5BU loaders, the jig shown in the accompanying illustrations has proved its value in the O'Fallon shop. A feature of its development was the fact that machining it required the construction of an auxiliary jig. The first step in making the jig was the machining of Shaft *A* (Fig. 5) from a piece of 3½-in. shafting

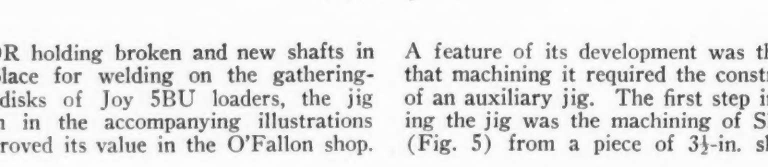


Fig. 1—(Left) Scribing attachment for marking circle on disk. Fig. 2—(Center) Jig assembled on Shaft *A*. Fig. 3—(Right) Jig in place on disk, showing Cap *E* bolted in place on shaft and copper ring used to back up the weld

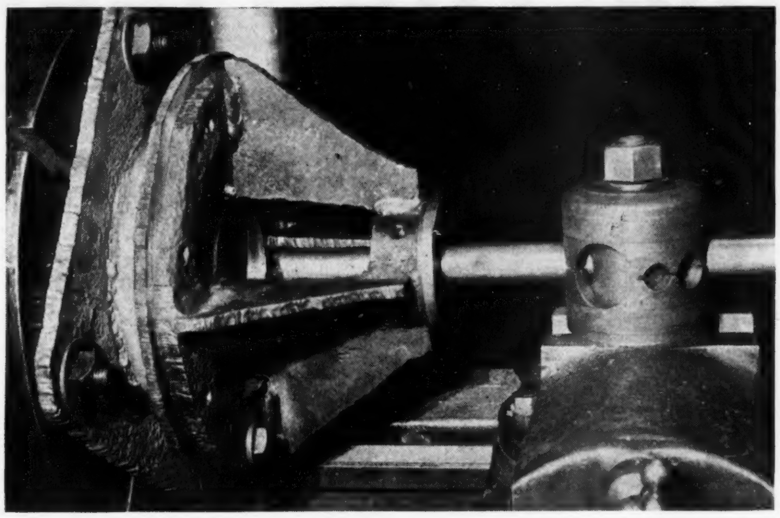


Fig. 4—Main jig held in place on lathe by auxiliary jig for boring out Collars *B* and *C*

11½ in. long. Collars *B* and *C* were then made to fit Shaft *A*. These collars were drilled and tapped for ½-in. setscrews, as shown, and then were placed on the shaft with the setscrews in line and tightened. The shaft was then placed on the lathe centers and each collar was marked lengthwise of the shaft in four places equidistant around its circumference.

From a sketch similar to the jig assembly in Fig. 5, the dimensions of Plate *G* were obtained and four were made. Ring *D* was then cut out of ⅜-in. steel plate. Shaft *A*, Collars *B* and *C*, Ring *D* and the four plates *G* were then assembled by holding the plates one at a time against the marks on the collars and tack-welding them in place. Ring *D* was then tack-welded in place, and welding was completed on both sides of Plates *G* along the lines of contact with the collars and ring. Plates *G* were then cut out with a torch as indicated in the sketch of the jig assembly to allow the inner circumference of Ring *D* to be machined. The assembly at this stage is shown in Fig. 2, and was ready to be placed back on the lathe centers with the Ring *D* toward the tail stock. Using the lathe dog and faceplate to turn it, the ring was faced off true and then bored out to fit snugly over the shoulder on the gathering arm disk to which the ring gear is bolted. After machining, Shaft *A* was removed, as it had served its purpose. The jig was then placed on the disk and holes corresponding to those in the disk were marked and drilled in Ring *D*.

Construction of the auxiliary jig was the next step. This jig was made of a piece of 13x13-in. steel plate, *H*, ½ in. thick; a ring, *J*, with a 13¼-in. outer and a 9⅜-in. inner diameter, cut out of ½-in. steel plate; and a band, *I*, of ½x3-in. steel bent into a ring with an outer diameter of 9⅜ in. and welded. The large faceplate was placed on the lathe spindle and a circle 9⅜ in. in diameter marked on it with crayon. Plate *H* was then clamped against the faceplate so that the hole in the plate and the chalked circle coincided, and four holes were marked on Plate *H*, using the common slots in the faceplate. After marking and drilling, Plate *H*, Band *I* and Ring *J* were assembled as in Fig. 5 and welded to make the auxiliary jig. The assembly was then bolted to the faceplate and Ring *J* turned to a true face; Band *I* also was turned to make a snug fit for Ring *D*, previously machined.

Rings *J* and *D* were then brought together and clamped to make them ready for boring Collars *B* and *C*, as in Fig. 4. Collar *B* was bored to fit the large diameter of the disk shaft and Collar *C* to fit the small diameter. Collar *C* also was faced to receive Cap *E* (Fig. 5), which was made with four equally spaced ¼-in. countersunk holes and a small flange to hold the cap in place over the outer end of the collar. The two ⅜-in. holes in the cap match the holes in the end of the shaft, which are tapped for ⅜-in. bolts. The center hole is tapped with a ½-in. tap to receive a setscrew, which aids in placing the shaft and removing the jig. Fig. 3 shows the jig in place on a disk with the cap fastened with a bolt in the end of the shaft. This figure also shows one of the two ½-in. capscrews in Ring *D* which are used to remove the jig from the disk, as well as the Copper Ring *F* employed to back up the weld.

Fig. 1 shows the scribing attachment made for marking the circle on the disk when a new shaft is installed. The base of the attachment was made to fit the bore in Collar *B*, with a small shoulder to keep it from slipping through. At the same time the outside diameter was turned a 1½-in. hole was bored to accommodate a pin with a shoulder to keep it in place in the hole. At the top of the pin is a ⅜-in. square hole to accommodate the shank of the crayon holder, which is held in place by a setscrew. A spring attachment holds the crayon and permits it to be pressed down while marking the disk. To use the attachment, the base is placed in Collar *B* and the jig is placed on the disk and clamped tight. The pin is then inserted through the hole left by the breaking away of the shaft and the crayon holder is adjusted to the desired circle size. When the circle is marked, the jig is removed and the hole can then be cut out with a torch and beveled for welding.

With the jig in place holding the disk shaft and other preparations made, just enough tack welds should be made to hold the shaft in place. Then the jig should be removed and a layer of beads applied and allowed to cool before another layer is put on. By following this procedure, there is small chance of warping the disk or getting the shaft out of line. For this application, electric welding is suggested.

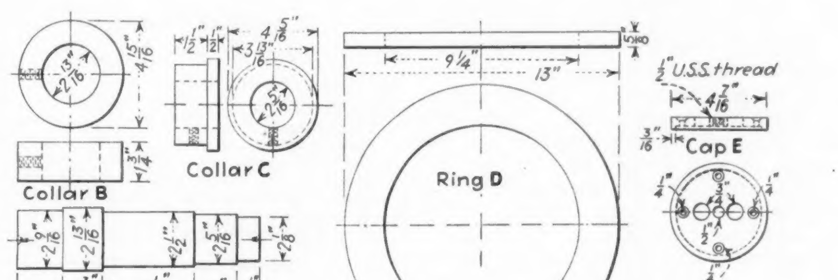


Fig. 5—Details of main and auxiliary jigs and parts

WORD FROM THE FIELD

Alabama Operators Act to Curb Competing Fuels

Opposition by coal operators to further inroads of natural gas on the Alabama coal market was voiced in a letter on Feb. 27 from the Alabama Mining Institute to representatives of the State in Congress. The communication expressed objection to an application for a PWA loan of nearly $300,000 for a transmission line from Jackson to Vicksburg, Miss. Over the signature of James L. Davidson, secretary of the institute, the letter says, in part:

"We are unable to get more details of the application, especially by whom made or the specific purpose of the project, but presume it is an auxiliary or booster of the line presently in operation from the Monroe (La.) gas field through Vicksburg into Jackson, and its object, purely to assist the Southern Natural Gas Co. in transporting additional natural gas into Mississippi, Alabama, Florida and Georgia to further compete with coal mined in Alabama, and thereby further displace Alabama coal mined in its natural trade territory, the result being to cause further unemployment of coal-mining and railroad employees in this section."

Anthracite Agreement Extended

Temporary extension of the present anthracite wage agreement from March 31 to April 30 was announced by the joint conference of anthracite miners and operators on March 25 after nearly a month of negotiations in New York City had failed to produce a new agreement. The agreement for extension, unprecedented in anthracite wage negotiations, also provided for the granting of still further time in case the month's grace proved insufficient for a settlement of the several questions before the conference (March *Coal Age*, p. 123).

Wage scales proved to be the chief stumbling block, according to reports. Countering the miners' demands for a "substantial" increase in rates and other concessions, operator representatives unexpectedly offered on March 13 a five-point counter proposal for reducing wage scales, enlisting the help of the union in eliminating bootleg mining, applying penalties for illegal strikes or stoppages, relating rates for mechanical mining to the decreased labor or increased productivity involved and changing the arbitration provisions of the present agreement to provide for compulsory enlargement of the board of two, now prescribed, by the addition of a third party in case of disagreement.

Wage scales, the operators proposed, should be modified to conform to those in effect under the Nov. 15, 1918, agreement, variously estimated to mean a reduction of 22 to 28 per cent from present levels. In proposing this reduction, the operators also asked that the term of the new agreement be five years, instead of the two-year term proposed by the miners. Revision of the present basis of fixing rates for new methods of mining or for the operation of mechanical-mining equipment were requested by the operators in the interest of progress and modernization of mining methods in the hard-coal region. Adoption of provisions for enlarging the arbitration board would, the operators felt, eliminate the stalemate encountered early in 1933, when refusal by the miner representative to sanction a decrease or permit enlargement of the board resulted in a deadlock on a wage reduction requested by the operators.

Keeping Step With Coal Demand

Bituminous Production

Week Ended:	1936 (1,000 Tons)	1935* (1,000 Tons)
Feb. 15	10,474	8,705
Feb. 22	9,873	8,470
Feb. 29	9,970	8,903
March 7	8,702	8,723
March 14	7,500	8,829
Total to March 14	97,629	91,273†
Month of January	39,330	36,681
Month of February	41,290	34,834

Anthracite Production

Feb. 15	1,535	1,157
Feb. 22	1,488	821
Feb. 29	1,590	970
March 7	850	734
March 14	740	704
Total to March 14	13,254	11,941†
Month of January	5,203	5,691
Month of February	6,466	4,505

*Outputs in this column are for the weeks corresponding to those in 1936, although these weeks do not necessarily end on the same dates.

†For the period ended March 16, 1935.

Bituminous Coal Stocks

(Thousands of Net Tons)

	Feb. 1, 1936	Jan. 1, 1936	Feb. 1, 1935
Electric utilities	5,983	6,250	5,421
Byproduct ovens	4,640	5,559	5,014
Steel and rolling mills	901	954	773
Railroads (Class I)	5,006	5,589	4,861
Other industrial*	9,038	10,365	7,876
Total industrial	25,568	28,717	23,945
Retail dealers	7,300	8,300	8,100
Grand total	32,868	37,017	32,045

*Including coal-gas retorts and cement mills.

Bituminous Industrial Consumption

(Thousands of Net Tons)

	Jan., 1936	Dec., 1935	Jan., 1935
Electric utilities	3,265	3,221	2,820
Byproduct ovens	4,765	4,850	4,058
Steel and rolling mills	1,166	1,117	1,142
Railroads (Class I)	7,884	7,390	7,190
Other industrial*	10,684	9,982	9,928
Total industrial	27,764	25,560	25,138

*Including beehive ovens, coal-gas retorts and cement mills.

Midwest Power Conference To Chart Progress

Practically every phase of power progress, as well as new developments in power machinery, will be covered in the programs of the Midwest Power Engineering Conference and the Midwest Power Exposition, to be held April 20-23 in Chicago. Twelve conference sessions will be held, the sessions and chairmen already selected including: "Power Economics," A. A. Potter, president, American Engineering Council; "Power-Plant Buildings and Dams," Daniel W. Mead, president, A.S.C.E.; "Electrical Problems," American Institute of Electrical Engineers; "Diesel and Internal-Combustion-Engine Power"; "Refrigeration," L. S. Morse, president, A.S.R.E.; "Fuels" and "Classification of Coals by Use Value"; "Power Piping and Welding," E. P. Rich; "Engineering Economics in the National Power Picture," F. F. Fowle, president, Western Society of Engineers; "Power-Plant Technics," A. D. Bailey, chief engineer, Commonwealth Edison Co.; "Fuel Utilization," E. H. Tenney; "Power Transmission to Machinery," G. C. Miller, president, Dodge Mfg. Co.; "Fuel Economy and Controls," Paul Doty.

Featured at the exposition, which will occupy 100,000 sq.ft. of space, will be power transmission, diesel and internal-combustion-engine power, fuel and lubrication, fuel burners, water treatment, refractories, controls, piping, power handling, motors, refrigeration, conveyors and many other items.

Coal on Capitol Hill

An amendment to S.3154, the Robinson bill now before Congress designed to prevent price discrimination on commodities of the same grade and quality regardless of the quantity sold, sometimes termed the chain-store bill, was introduced in the Senate on Feb. 25 by Senator King, of Utah. The amendment, Subsection (e), reads as follows:

"Nothing in this section contained shall prevent the sale or purchase of crude mineral products or metals in the form in which they are loaded for shipment at prices or terms of sale based upon differences in the grade, quality, or quantity of such products, or that make only due allowance for differences in the cost of selling or transportation, or discrimination in the price of such products in the same or different communities made in good faith to meet competition."

A bill providing for the creation of a fuel research commission (H.R.11398) to "investigate, develop, and promote renewable sources of supply for fuel adapted to the use of internal-combustion engines; to im-

prove fuels produced from such sources and promote their use in interstate and foreign commerce and in aid of such commerce; and to develop beneficial uses for the by-products resulting from the production of such fuels," was introduced in the House Feb. 22 by Representative Lea, of California. By the provisions of the measure, the commission would consist of the directors of the U. S. Geological Survey, the Bureau of Mines, the Bureau of Standards, the Bureau of Plant Industry, and the Bureau of Chemistry and Soils, all to serve ex-officio and without compensation by reason of membership on the commission.

To Mine Virgin Hard-Coal Field

The Lorberry Creek Anthracite Corporation has taken over and plans to operate 1,447 acres of virgin coal land in Tremont township, Schuylkill County, Pa., leased from the Lehigh Valley Coal Co. The lessee purposes erecting during the coming summer a modern breaker with a capacity of 1,000 tons per day, work on which will begin about April 15. Meantime coal is being mined from drifts on several seams on the property, in addition to stripping operations by power shovel by the firm of Gaynor & Sheidy, of Pottsville, which has a contract for this work. This coal is being shipped to another breaker for preparation.

The Lorberry Creek company, which was formed in December, 1935, has offices in Pine Grove, Pa. The officers are as follows: president, John H. Keith, formerly with Whitney & Kemmerer; vice-president and secretary, John H. Kresge; treasurer, George T. Williams, formerly sheriff of Lackawanna County; vice-president, Edward S. Keith.

To Work Richmond Field Soon

One thousand tons output of coal daily by next autumn is the immediate goal of the Great Southern Morgan Coal, Coke & Mining Corporation, which plans to operate in Chesterfield County, near Richmond, Va. (*Coal Age*, September, 1935, p. 396). H. W. Morgan, president of the company, said the first pit to be opened would be not more than 14 miles from Richmond, shipments to be made via the Southern Ry. He added that members of the United Mine Workers would be employed and as much of the needed labor as possible would be drawn from Richmond.

Other officers of the company are: vice-presidents, Jacob L. Warner, manager, real estate division, E. I. duPont de Nemours & Co.; W. G. Crichton, Wilmington, Del., and Allan J. Saville, Richmond; treasurer, M. F. Judge, Wilmington; secretary, Thomas P. Morgan, son of the president. Directors, in addition to the above, are: Benjamin P. Foster, William Staniar, H. D. Harkins, W. T. Homewood, C. A. Mellinger, M. G. Kennedy and Charles H. Gant, all of Wilmington; C. D. Jones, Pennsylvania coal operator; Godfrey M. S. Tait, formerly chairman of the Bituminous Coal Arbitration Board; F. R. Wadleigh, formerly consulting engineer, U. S. Bureau of Mines, and T. Coleman Andrews. Captain Tait will be in charge of sales promotion and Mr. Wadleigh will be chief consulting engineer.

Federal Control of Stream Pollution Challenged At Senate Committee Hearings

WASHINGTON, D. C., March 24—Industry challenged the advisability of federal control over all stream-pollution problems when hearings on bills introduced by Senator Lonergan of Connecticut were resumed before a subcommittee of the Senate Committee on Commerce yesterday. These bills (S. 3958 and 3959) would make permanent the National Resources Committee established by Executive order last June and authorize that committee to establish sanitary water districts empowered to fix standards of purity for the waters of each district and to lay down minimum requirements as to treatment of polluting material before discharge into such waters.

Under the Lonergan proposals, the National Resources Committee would consist of the Secretaries of War, Treasury, Agriculture, Commerce and Labor, the Federal Emergency Relief Administrator and three paid appointive members. The committee would be charged with the following duties in connection with water pollution: (1) Coordinating the activities of the several States, (2) encouraging enactment of uniform State laws, (3) encouraging State compacts, and (4) making studies, surveys and experiments and devising preventive and corrective measures. The committee also would be empowered to bring action against anyone polluting navigable waters or their tributaries in violation of its regulations.

Will Make Loans and Grants

Authorization also is given for loans and grants on the request or recommendation of a State agency or board of a sanitary district. In the second of the two measures sponsored by the Senator from Connecticut reference is made only to street and sewage wastes and oil pollution of coastal waters. Proponents of the proposals had their first innings at the opening hearings held by the subcommittee Feb. 26. Critics of the measures are expected to continue their attacks at further sessions tomorrow and Thursday, and additional proponents also are slated to testify.

That water pollution cannot be removed by any sudden legislative change was admitted by the sponsor of the bills himself in a statement presented at the opening of the hearings yesterday. The Oil Pollution act, he pointed out, has been on the statute books for twelve years, but oil pollution is still a live problem. In the opinion of the Public Health Service, continued the Lonergan statement, the States apparently cannot provide remedial measures. A step-by-step method is essential. Some methods of correcting pollution are recognized as too expensive, and the correct method of meeting the pollution problems of certain industries has yet to be devised. The paper-and-pulp industry, for instance, has spent $2,000,000, but has succeeded only in producing products of little value. It was with these facts in mind that the legislation he proposed has been framed.

Declaring himself neither a proponent nor an opponent of Senator Lonergan's bill, Abel Wolman, for the National Resources Committee, asserted that the proposed revised committee with the secretaries of the five interested departments, the Federal Emergency Relief Administrator and only three paid appointive members, is loaded down with too many political appointees to pursue a consistent, continuous policy such as would assure the desired results.

Studies of the situation had shown that five or six States had laws admirably suited to obtain results but had labored for 20 years and produced an amelioration of condition no greater than States which had no law to implement their efforts. Cooperative effort has been found more effective. Fourteen million persons live in urban areas that have no form of sewage treatment. The trouble lies not in lack of law but in lack of money and inclination on the part of the citizens to provide it.

Cost of Correction Enormous

Streams, said Mr. Wolman, probably could be freed of domestic wastes at the cost of a billion dollars of investment, but that sum would not cover the operating costs. Industrial-wastes pollution perhaps could be eliminated at an investment cost of three to five billions of dollars, but this would make no provision whatsoever for costs of operation, and the volumes of industrial waste are tremendous. Two industrial plants alone have a flow of waste exceeding the entire flow from the District of Columbia, and their effluents are not unusually large.

Greater attention, Mr. Wolman contended, should be given to conditions within the plant that created pollution problems than to the means whereby such pollution could be corrected thereafter. Standards of cleanliness for water had not been determined, and a biologist, asked to declare a bacteriological standard, admitted that the state of technique did not permit of a decision. Thus blanket federal legislation is undesirable. No two streams, moreover are alike as to flow, topography or use. What might be important on the Ohio would be less important on the Potomac and needless on the Colorado River. He favored State compacts, grants in aid of treatment plants, investigations and coordination. He would continue to stimulate all efforts being made within State lines. The powers proposed for the National Resources Committee were too large, covering as they did administrative, appropriative, planning and regulative functions. The Public Health Service had failed to give proper direction to the public on matters of this sort, but would do its duty if appropriated enough money.

Waste disposal, averred J. D. Conover, secretary, American Mining Congress, is not a single national problem, justifying federal regulation, but essentially a State and local problem; in fact, an innumerable series of local problems, in which conditions as to the types of various materials, the extent to which the waterways are needed for their disposal, the possible detriment that may be caused to other communities and the preventive or regulatory measures required vary in each case. Public Health Service, U. S. Geological Survey, U. S. Bureau of Mines, the Corps of Engineers and other agencies have

assembled information of great value—a proper and desirable field for federal activity.

Quoting the report of the Special Advisory Committee that "there is, unfortunately, a widespread fallacy to the effect that treatment of sewage and industrial waste is or can be made self-sustaining or even profitable: The contrary is nearer the truth." Mr. Conover asserted that "acid drainage of mines, although it may render certain streams unfit for fish, is a menace neither to health nor navigation. As long ago as 1904, the U. S. Geological Survey (*Water Supply Paper No. 108*) pointed out that the acid mine wastes from the anthracite fields of Pennsylvania are beneficial in improving the sanitary condition of waters from that region," that "Susquehanna River water could not be used in its raw state for household purposes if no mine drainage was turned into it and referred particularly to the purifying effect of acid mine waste as helping to prevent the water from becoming a nuisance and a damage to realty values." To fail to recognize the necessities of the industry in regard to mine wastes would shut down operations, create unemployment and cause abandonment of entire communities which now contribute to our national wealth.

In West Virginia, said Mr. Conover, referring to the testimony of Congressman Wells Goodykuntz (hearing before Committee on Rivers and Harbors, 1921), a law was passed forbidding the putting into streams of sawdust and other deleterious substances, but this legislation, being a source of constantly recurring grievances, was repealed because the coal mines, sawmills and pulpmills were of more value than a few fish. Legislation of the nature of S. 3958 and S. 3959, he asserted, is not needed.

Silt Streams With Fine Coal

Complete elimination of 60-mesh coal and smaller from the breakers and washeries of anthracite mines of Pennsylvania, said Charles Dorrance, president, Penn Anthracite Collieries Co., speaking for the Anthracite Institute, can be accomplished only by elaborate settling and clarification plants which would cost something over $7,000,000. Annual operating and maintenance costs of these clarification plants would be about $1,800,000. But even with these large expenditures on investment and operating costs, the streams would not be clean, because the dust could not be stored at points so remote that it could not be eroded. Silt banks are even now being washed into the streams at high water.

Plants to neutralize anthracite mine water would cost somewhat more than $30,000,000 and the cost of operation would be about $15,000,000 annually. About 4,000 lb. of lime would be needed per thousand gallons of water, or about 500,000 tons annually, which is a little less than one-quarter of all lime produced in the United States in 1933 and more than the entire production of lime in Pennsylvania in that year. During the last four years the industry has operated at a total loss of $31,000,000, or about 20c. per ton. An increased loss of 30c. per ton would be incurred if the law proposed were made effective, and the employment of miners would be decreased greatly. None of the municipalities in the anthracite region has sewage disposal, and if the mine wastes were removed, the sewage effluents would be seriously detrimental to hundreds of thousands of residents in the region.

Half a million persons in the industry, said J. D. Battle, executive secretary, National Coal Association, were directly affected and as many more indirectly. From 500,000,000 tons the output of bituminous had dropped to 350,000,000 tons annually, and this bill might add its evil effects to those of other depressants, such as competition with other fuels and more economical use of coal.

"Measured by lack of complaints," stated Paul Weir, vice-president, Bell & Zoller Coal & Mining Co., speaking for the Illinois Coal Operators' Association under the aegis of the National Coal Association, "no problem of pollution exists in Illinois so far as coal is concerned." Nevertheless, the Illinois Association is opposed to Secs. 6 and 7 of Senate Bill 3958, which require the establishing of standards. Such standards undoubtedly will introduce a pollution problem "the size and scope of which connot be determined from the proposed legislation itself."

Coal operators, said H. N. Eavenson, Eavenson & Alford, while thoroughly in sympathy with protection of human life, object to putting fish and aquatic life on the same plane with industry and doubt if so doing is in the public interest. No standards are given in S. 3958 by which one can judge what waste will be made a common nuisance. Will water discharged into the stream by steam mills and power plants at 130 deg. F. be so regarded? Few, if any, fish can live in such water, though, after cooling, this water is as good as any other.

Cost of treatment at bituminous plants would be at least 10c. per ton, and the capital expenditure not less than $300,000,000. Annual operating charges would be at least $40,000,000, and the results would not meet the requirements of the act. As most of the coal fields outside Pennsylvania, northern West Virginia, eastern Ohio and Maryland, with a few sporadic cases in a few States, do not have acute acid conditions, such legislation would be detrimental to some States and fields and thereby help others, including his own operations. While this was pleasing to him, it was disturbing to the balance and harmful to national interest.

Speaking favorably of sealing abandoned mines, Mr. Eavenson suggested that while the problem had not been studied in the anthracite region, undoubtedly conditions there can be greatly benefited also by such work. Replying to a mis-statement, Mr. Eavenson asserted that the Calumet neutralization plant of the H. C. Frick Coke Co., opened about 1916, was opened to obtain water for quenching coke in place of the acid water in Sewickley creek. It was operated until 1923, when the coke plant was shut down and the water-treating plant dismantled. The water was used only for quenching coke and was suitable for no other purpose without further treatment. The plant broke even only during the War, when the price for the material produced was high. Today it would be impossible to produce it without heavy loss. Fine coal from coal-washing plants can be removed from the water at small capital and operating costs, and it would not be a great hardship to require all new plants to be equipped to prevent this method of pollution and also to require existing plants so to equip themselves after a reasonable time.

Neutralize and Soften?

Coal men are opposed to any legislation at present, declared A. B. Crichton, president, Johnstown Coal & Coke Co., representing the N.C.A. and the Central Pennsylvania Coal Producers' Association, for the mining industry cannot stand any additional burdens. For each acre exhausted, an average of 1,000 gal. of water per day enters the mines. He estimated that 750,000,000 gal. had to be passed to the surface daily. The acid in this water cannot feasibly be neutralized. Investment cost would be $100 per thousand gallons, so that the cost for installation would be $75,000,000.

If the water still must be softened, the installation costs would be twice as high. Sludge is difficult to handle because it is too heavy to pump and too thin to shovel. Germany depends on adding alkaline water from the streams to keep the river water alkaline. It does not neutralize the water by other alkaline material. Sealing gives excellent results where the roof does not have crevices to the surface, but at Indian Creek no success was attained because breaks had occurred that were not revealed at the surface and, therefore, could not be sealed. That plant had constructed a tunnel at a cost of $400,000 rather than neutralize its water. He confirmed what Mr. Eavenson had said as to the Calumet neutralization plant, except that Calumet was chosen by the H. C. Frick Coke Co. because at that plant there was more iron oxide and less acid than at the other plants.

Mine- and preparation-plant waste contribute little to stream pollution, asserted James L. Davidson, secretary, Alabama Mining Institute. Removal of fine solids and their disposition beyond possible erosion, he continued, would be extremely costly. Where mine water is acid, it is readily neutralized by spring waters of streams. NRA regulations administered to meet conditions in West Virginia and Pennsylvania, he added, had put the Alabama coal industry in a straitjacket. In the same way he feared that legislation

Coming Meetings

- Virginia Coal Operators' Association: annual meeting, April 18, Norton, Va.
- Rocky Mountain Coal Mining Institute: annual meeting, April 23-25, Salt Lake City, Utah.
- Fourth Annual Mineral Industries Conference of Illinois; April 24-25, Urbana, Ill.
- American Mining Congress: annual convention and exposition, May 11-15, Cincinnati, Ohio.
- Big Sandy-Elkhorn Coal Operators' Association: annual meeting, June 2, Ashland, Ky.
- Illinois Mining Institute: 18th annual boat trip and summer meeting, June 5-7, on Str. "Golden Eagle," leaving St. Louis, Mo., at 11 p.m., June 5, and returning to St. Louis at 10 a.m., June 7.
- Mine Inspectors' Institute of America: 27th annual convention, June 29-30 and July 1, Shirley-Savoy Hotel, Denver, Colo.

aimed at the elimination of extreme pollution in Pennsylvania might be imposed upon Alabama and inflict similar injuries on her industries without any compensable advantage to the public.

R. M. Searls, spokesman for the American Mining Congress, on behalf of the California gold fields; D. A. Callahan, Callahan Zinc-Lead Co.; H. E. Jordan, Chamber of Commerce of the United States, and James A. Emery, National Association of Manufacturers, also criticized the Lonergan program.

"We must destroy stream pollution or it will destroy us," declared Senator Lonergan at the initial hearing on Feb. 26. Stream-pollution abatement is not a luxury or comfort improvement, said G. C. Ladner, Deputy Attorney General of Pennsylvania; it is a necessity. The worst stream pollution is in interstate waterways and their tributaries, and, therefore, such pollution is a matter of national concern. Industrial pollution and municipal sewage pollution must be attacked as a single problem, and at the same time.

"It will not cost us one thin dime, I believe, to clean up water pollution," declared K. A. Reid, Board of Fish Commissioners of Pennsylvania. "We are paying today for pollution with interest, but all we are getting for what we pay is a bacteriologically safe fluid; in many cases I would not call it water. We pay the bill but have nothing for it." So much chlorine, remarked M. D'A. Magee, national vice-president, Isaac Walton League of America, is added to the water that our patients cannot drink as much of it as they need.

Communications were presented from Secretary H. L. Ickes advocating that the National Resources Committee be retained as an advisory planning body, without executive or administrative functions, but advocating interstate compacts and conservancy districts. He thought some of the powers sought for the committee as to loans and grants could be left to the Public Works Administration, avoiding duplication, and he called attention to the recommendation of the National Resources Committee that a permanent National Development Administration be established to perform the duties now lodged in the Emergency Administration and related agencies.

Allotments made by the PWA covered 133 projects, said Mr. Reid, involving the construction of sewage-treatment works and for 420 projects involving sewage facilities without sewage-treatment works. Allotments for sewage-disposal projects are only 22 per cent of those for sewage, and the estimated costs of sewage-disposal work is only 19 per cent of the estimated cost of sewers, reflecting the relative lack of interest in control of pollution of rivers.

Service Group Dissolves

The Anthracite Service Corporation, of Trenton, N. J., organized four years ago to promote the sale of anthracite burning equipment and perform other services in promoting the use of hard coal in that territory, disbanded March 17, according to an announcement by J. N. LeClare, secretary of the organization. Sales agencies for the equipment which has been handled by the corporation, however, will be appointed by the manufacturers, and there will be no interruption of service.

Floods Curtail Mining Activity in East; Pennsylvania Plants Hardest Hit

ANTHRACITE MINES in the Avoca-Duryea-Pittston triangle of Luzerne County and bituminous operations north and east of the Pittsburgh district bore the brunt of the direct damage from the flood waters which inundated large areas in the East last month, according to a telegraphic check of the situation made by *Coal Age* March 23-25. With the exception of two mines in Harlan County, Kentucky, all of the Southern high-volatile fields appear to have escaped any material direct damage. Low-volatile operations in the New River and Pocahontas districts also experienced no real flood troubles. Minor local drainage difficulties were reported from various parts of the Southern fields because of the abnormal surface influx caused by the heavy snows. Some operations in the West Virginia Panhandle suffered losses and one river loading plant on the Ohio side was destroyed. Newspaper reports indicated considerable damage in the Pomeroy field of southern Ohio. No estimates of the total losses in the mining regions can be made at this time.

In many sections hit by the floods, mining operations were sharply curtailed not because of water in the mines but because of power failures, lack of railroad cars due to washouts or inability of the men to reach the mines because of road conditions. In several cases, flooding of central-station plants resulted in the complete cutting off of power to the mines and, as this service was restored, in rationing of power supply. As a result some underground pumping stations were put out of commission and some equipment was lost. High water also took its toll of surface plants in some areas.

Pittston Co. Seriously Affected

While the influx of water kept pumps working at capacity in the northern anthracite field, few operations outside the Avoca-Duryea-Pittston triangle encountered serious trouble. The Pittston Co. was the hardest hit of the bigger companies. Water breaking through a cave hole on a farm in the Duryea sector poured into a number of intercommunicating operations before the hole could be plugged. Among the mines affected in the triangle were Pittston No. 9; the Phoenix and Seneca collieries of Pittston-Duryea Coal Co.; Kehoe-Berge, Heidleberg and Barnum Coal companies. The Ewen and Central workings of the Pittston Co. also were closed down until enough water could be pumped out to avoid the danger of barrier-pillar collapse. It was unofficially estimated that it might take a year to completely dewater some of the operations in the triangle area. Joseph J. Walsh, Deputy Secretary of Mines, established temporary headquarters at Wilkes-Barre and a committee of War Department engineers were detailed to make an examination of the affected area.

Mines of the Hudson Coal Co. were not affected; no time chargeable to flood conditions was lost by Susquehanna Collieries Co. and no Glen Alden operation was seriously affected. Very little damage was suffered by Madeira-Hill operations and flood waters in the Frackville area were reported under control. Despite an extremely heavy inflow in the Panther Creek valley, the emergency flood-control dams and the usual pumping equipment prevented any extensive damage at Lehigh Navigation Coal Co. operations. The lower level of the No. 1 slope at Cranberry colliery, near Hazleton, however, was flooded and the main pumping plant lost; reserve equipment was promptly put into service and dewatering started while operations were resumed at other levels.

Despite the heavy losses in the Pittsburgh industrial district, the mines in that district suffered little damage from the flood waters but were seriously inconvenienced by central-station shutdowns. Few, if any, operations anticipate any extensive purchases of new equipment, although there is an active demand for pipe. More direct damage was suffered in Fayette and Westmoreland counties and in the Freeport district. Four mines in Fayette County were completely flooded out and several mines lost their underground pumping stations. Replacements and reconditioning, it is estimated, will cost several hundred thousand dollars and may go over the $1,000,000 mark. Reports from the Johnstown area are scattering; data available at press time indicated that there was little permanent damage to underground workings but that several tipples and power lines have been seriously affected and rebuilding, in some cases, will be necessary. A dispatch from Johnstown on March 26 stated that five surface plants in Cambria and Somerset counties had been washed out or materially damaged by the flood. It was expected that the job of dewatering mines in the central Pennsylvania area would be completed by the end of the week.

Except for the washing away of the Costanzo loading dock on the Ohio side, mining operations in eastern Ohio suffered principally from power failures and washouts of railroad tracks; direct damage to mine plants and equipment was said to be very small. The Hocking district also appears to have escaped flood losses. The river tipple, conveyor and loading equipment of the Alexander mine of the Glendale Gas Coal Co., Moundsville, W. Va., was destroyed by the flood. Operations in the Fairmont and Clarksburg areas escaped flood conditions. Storms and floods closed down the operations of the Berger Coal Mining Co. and the Southern Harlan Coal Co., in Harlan County, Kentucky. In the case of the Berger mine it is estimated that it will cost approximately $5,000 to recondition damaged equipment. The Southern Harlan mine was a great sufferer, as it will have to replace its conveyor line at an estimated cost of between $25,000 and $40,000. Both mines expect to be down for at least a month.

To Hold Fuel Conference

A conference on solid fuels and domestic stokers will be held April 21-23 at the University of Wisconsin. The event—the second of the kind at Wisconsin—will be held in the mechanical engineering building, college of engineering, at Madison, the program consisting of lectures, demonstrations, exhibits and other features.

Organize New Consulting Firm

D. B. Rush and Keith Roberts have organized the Rush-Roberts Engineering Co., Field Building, Chicago, to specialize in engineering, testing, inspection and consultation in the civil, mining and construction fields. Mr. Rush was formerly connected with the Robert W. Hunt Co. and a number of Chicago engineering firms. Since his graduation from the Colorado School of Mines in 1915, Mr. Roberts has been engaged in mining engineering work.

Setback for Progressives

The Progressive Miners received a setback on March 2, when the Supreme Court of the United States refused to review the decision of the U. S. Circuit Court of Appeals in the injunction suit of the United Electric Coal Cos. growing out of the strike of Progressives at Red Ray No. 13 mine, near Freeburg, Ill. The Circuit Court of Appeals at Chicago ordered the issuance of the injunction to prevent the Progressives from interfering with operation of the mine under a contract with the United Mine Workers (*Coal Age*, February, p. 86), and the Progressives appealed to the Supreme Court from this decision. By refusing to review the case, the high court put an end to the matter, and the injunction stands.

Industrial Notes

FEENAUGHTY MACHINERY CO., Portland, Ore., has been appointed distributor for Link-Belt shovels, cranes and draglines in Pacific Northwest territory.

CARNEGIE-ILLINOIS STEEL CORPORATION has consolidated the Lorain Division district offices with established district offices in Chicago, Philadelphia, Pa.; New York, Cleveland, Ohio, and Pittsburgh, Pa. The following Lorain Division personnel have been appointed: H. H. MCDONALD, special sales representative, railroad division, Western area, Chicago; S. J. COTSWORTH, assistant manager of sales, Philadelphia; T. W. BRUSH, special sales representative, New York; OTTO FISCHER, special sales representative, Cleveland; H. L. GLEESON, special sales representative, Pittsburgh.

ILLINOIS TESTING LABORATORIES, INC., Chicago, announce the appointment of RALPH W. BERGEN, 328 Chestnut St., Philadelphia, Pa., as representative for Maryland, Delaware, southern New Jersey and eastern Pennsylvania.

ROOTS-CONNERSVILLE BLOWER CORPORATION, Connersville, Ind., announces that its Chicago office is now in the Marquette Building, 140 South Dearborn St., in charge of William Townsend, district manager, assisted by James T. Sutliff, formerly connected with the factory.

GENERAL ELECTRIC CO. has appointed Harry A. Winne manager of sales of the company's mining and steel mill section, succeeding K. H. Runkle, who was recently made assistant manager of the industrial department. Mr. Winne formerly was in charge of the steel mill section of the industrial engineering department.

Link-Belt's automatic coal-heat display

Stoker Makers to Fore

A permanent exposition of automatic coal-heat equipment, to be held by Link-Belt Co., had a three-day preview on Feb. 25-27 at the company's Chicago headquarters, 307 North Michigan Avenue. With prominent coal and heating men as guests, the advance showing featured the company's 1936 model residential stoker under fire in a steam boiler, a commercial size stoker in a bricked-up firebox setting, and an industrial model in a firebox-type steel boiler. The two larger units were not under fire but were connected with electrical controls for motor operation. An automatic air control, shown in operation on the air duct of the residential stoker, is said by the company to eliminate the necessity of changing air adjustments to suit varying combustion characteristics and thus will cut down stoker service calls 50 to 75 per cent.

A 50 per cent increase in the capacity of the Cleveland plant of the Iron Fireman Mfg. Co. is under way with the erection of two additional units. The main addition, of steel-frame construction, 172x211 ft., will house a complete enameling room for finishing machines, and the machining and press departments. The second structure, a 25x200-ft. lean-to, will provide enlarged shipping facilities for the entire plant. The project is scheduled to be completed May 1.

Combustioneer, Inc., hitherto a subsidiary of Steel Products Engineering Co., Springfield, Ohio, has been merged with the latter company and hereafter will be known as Combustioneer Division of the parent company. An addition covering a full city block has been built to the plant, giving it a production capacity of 150 stokers daily. R. C. Goddard, formerly president of Combustioneer, has been made vice-president in charge of the stoker division.

Form Colorado Safety Group

Operators, miners and State officials organized the Northern Colorado Mine Safety Association Feb. 28 at a meeting in Denver and elected State Coal Mine Inspector Thomas Allen president. The new organization, which has for its object the improvement of conditions in northern Colorado mines, voted to affiliate with the Holmes Safety Association. Harry A. Tieman, director of State vocational education, was named secretary-treasurer, and the following committee was elected: John R. Lawson, manager of operations, Rocky Mountain Fuel Co.; James Brennan, president, Imperial Coal Co., and Frank Yakes, president, Louisville-Lafayette Coal Co., representing the operators; Robert Johnson, O. B. Patton and K. N. Beltz, representing the miners; W. H. Young, chairman, State Industrial Commission, and E. H. Denny, U. S. Bureau of Mines.

Personal Notes

ROBERT C. ADAMS, president, Bancamerica-Blair Corporation, New York City, was elected a director of the Lehigh Navigation Coal Co. at the annual meeting, Feb. 24. He succeeds Edward L. Love, a vice-president of the Chase National Bank, New York, who resigned. Bancamerica-Blair headed an investment-house group that recently acquired 250,000 shares of the coal company's stock.

O. W. EVANS, general superintendent, fuel department, Norfolk & Western Ry., Roanoke, Va., has been elected president of the Williamson District Council of the Holmes Safety Association.

HARRY C. FORD has been appointed general superintendent of the Bird Coal Co., Johnstown, Pa. He succeeds George Winder.

GEORGE B. HADESTY announces that he has resumed practice as consulting engineer with offices in Pottsville, Pa. In November, 1933, he was Presidential appointee on the Northern West Virginia Subdivisional Bituminous Coal Code Authority, having previously been for ten years a director of the Pemberton Coal & Coke Co. and, over a long period of years prior to 1928, superintendent, division superintendent, general superintendent, and general manager for the Philadelphia & Reading Coal & Iron Co.

GEORGE H. REINBRECHT, formerly coal traffic manager of the Erie R.R., has been appointed coal traffic manager of the

Chesapeake & Ohio Ry. with headquarters at 2904 Terminal Tower, Cleveland, Ohio, and F. H. CUMMINGS has been promoted from assistant general coal freight agent to general coal freight agent, with offices in the Union Central Building, Cincinnati, Ohio, vice A. M. Dudley, deceased. Both appointments are effective April 1.

E. M. ROSSER has been elected president of the Kingston Coal Co., Kingston, Pa., and active direction of the company has been placed in the hands of WALTER OLIVER, named general manager and treasurer. L. M. EVANS has been chosen vice-president.

A. W. VOGTLE, sales manger, DeBardeleben Coal Corporation, Birmingham, Ala., has been elected general chairman of the Southeastern Shippers' Advisory Board.

PAUL YANKEE, of Bluefield, W. Va., has been appointed as assistant to R. E. Salvati, general manager of the Island Creek Coal Co. and also vice-president and general manager of the Pond Creek Pocahontas Co. Mr. Yankee has been connected for the last four years with the National Armature Co. and was formerly purchasing agent for the Pocahontas Fuel Co.

Sales of Mechanical Stokers Ahead of Last Year's

Sales of mechanical stokers in January totaled 2,497, of which 2,065 were small residential-size units (under 100 lb. of coal per hour), according to statistics furnished the U. S. Bureau of the Census by 108 manufacturers. This compares with sales of 3,663 units in the preceding month and 1,588 in January, 1935. Sales of other types of mechanical stokers in January, 1936, were: apartment-house and small commercial heating jobs (100 to 200 lb. per hour), 187; general heating and small high-pressure steam plants (200 to 300 lb. per hour), 84; large commercial and high-pressure steam plants (over 300 lb. per hour), 161.

To Reopen Rachel Mine

Rachel mine, situated ten miles west of Fairmont, W. Va., has been acquired by the Jones Collieries, Inc., which plans to resume operations at the plant by April 1. The Jones company, formed to take over the mine, has headquarters in Pittsburgh, Pa., and has the following officers: Marshall J. H. Jones, president; H. H. Van Cleef, vice-president, and J. Stan Jones, secretary-treasurer.

A new tipple is being built to replace the one destroyed by fire in January, 1935. Equipment in the new structure will include vibrating screens, loading booms, picking tables, chemical treating apparatus and magnets to remove tramp iron from the fine sizes. Daily capacity will be 2,000 tons in one shift.

E. F. Miller, who opened the mine in 1917 for the Bertha Consumers Co., and lately has been superintendent of the Crested Butte mine, Colorado Fuel & Iron Co., is in charge of operations for the present owners. The Bertha company sold the property in 1927 to the Cosgrove-Meehan interests, which operated the plant until the fire of a year ago.

Guffey Act Validity Argued in Supreme Court; Commission Fixes Classification Standards

WASHINGTON, D. C., March 24—After arguments lasting most of March 11 and 12 before the Supreme Court of the United States for and against the Bituminous Coal Conservation Act of 1935, the coal industry eagerly awaits the ruling of the high court on the constitutionality of the law. In the words of John Dickinson, Assistant Attorney General, who argued the government's case, "much may turn on the decision of this court. The issues are vastly more tremendous than merely those in the present act. The whole issue of federal power is at stake—whether there lurk in the Constitution interstices and crevices through which required federal power may have sifted away."

Frederick H. Wood, attorney for the plaintiff in the Schechter poultry case, which resulted in the nullification of NIRA, represented James Walter Carter, president, Carter Coal Co., and former Judge Charles I. Dawson, of Kentucky, appeared in behalf of the Tway Coal Co. and nineteen other Kentucky producers who challenged the validity of the act in the Supreme Court after the government came off victorious in the first skirmishes in the lower courts (*Coal Age*, December, 1935, pp. 547-8). Not only were lengthy briefs filed by the parties to the action but seven States also entered briefs in favor of the act as "friends of the court," as did the United Mine Workers and 612 companies members of the Bituminous Coal Code. The States which urged the Supreme Court to sustain the law, on the ground that the commonwealths were "legally and practically incompetent" to stabilize the industry within their own borders, were New Mexico, Indiana, Illinois, Kentucky, Pennsylvania, Ohio and Washington. On the other side, 66 coal operators who are resisting the law through injunctions in lower courts contended that the act is unconstitutional as an invasion of States' rights.

The wages and hours regulations of the act, as well as the price-fixing feature, were the special targets of Mr. Wood. He contended that the provisions of Sec. 3 of the act are not a revenue measure but were designed as a club to force the operators to join the code. The tax he described as a "ruinous financial penalty in the guise of a tax," and said its provisions were unduly severe.

Effort to Evade NRA Edict?

"If the Congress can regulate the production of coal upon the theories now advanced," he said, "then it may regulate piecemeal and one by one substantially every industry in the country and thereby be enabled to exercise the power specifically denied to it in the Schechter case when attempted through enactment of a single law pertaining to all industry."

Collective bargaining, said Mr. Wood, was even more remotely connected with interstate commerce than the control of wages and hours. Collective bargaining was designed as a means to prevent strikes, but he did not believe that it was possible to use it legally any more than it was to employ maximum wages and minimum hours for such a purpose. "The purpose of this statute is not to make commerce free but to impose a legislative fiat on the free movement of coal."

Former Judge Dawson assailed the labor and collective bargaining provisions of the act, contending that they were contrary to numerous Supreme Court rulings that mining was an intrastate matter. He also denounced the action of the Attorney General of Kentucky in filing a brief asking the court to sustain the Guffey law.

In his plea for the government in favor of the act, Mr. Dickinson held that the act must be considered in the light of more than a quarter century of legislative discussion. In confirmation of the contention that coal is affected with public interest, he pointed out that the industry is seriously disorganized and that conditions therein tend to obstruct commerce and waste the nation's resources. Federal regulation is necessary, he asserted, because the industry is "nation-wide in its extent, carries on extensive operations in interstate commerce, directly affects the interstate commerce in other industries dependent on bituminous coal for fuel, and presents problems national in their scope."

Argues Provisions Are Severable

Arguing that the provisions of the act constitute a valid exercise of Congressional power, the government advocate insisted that should any provisions of the act be declared invalid, that finding would not affect the validity of the law as a whole. Therefore, he said, "the petitioner may be constitutionally required to comply with the provisions established to be within federal power."

The tax imposed by the act, he contended, is constitutional if the regulatory provisions are constitutional, though he conceded that the validity of the tax imposed by Sec. 3 could not be supported upon any other basis than the power of Congress to regulate commerce among the several States. Regulation of prices, as provided for in the act, said Mr. Dickinson, also is a legitimate exercise of this power. Since the price regulations are reasonable, he added, there is no infringement of the rights guaranteed by the due process clause of the Fifth Amendment. Furthermore, he maintained that the mechanism for determining prices is reasonable and does not involve an unconstitutional delegation of legislative power.

In connection with the unfair trade practice provisions of the act, Mr. Dickinson pointed out that the petitioner conceded that some of the practices specified in the law as unfair may be constitutionally prohibited by Congress under the commerce power, and he professed to see no reason why this power should extend to one aspect of competition and not to another. In like manner, he characterized the minimum-wage and maximum-hour provisions, as well as the sections protecting the right to organize and bargain collectively, as a valid exercise of the commerce power.

Declaring that the bituminous coal industry is one that should be controlled so that the natural resources of the nation will be preserved, the Kentucky brief said that such regulation is beyond State con-

trol. The Illinois brief contended that national action through the Guffey act was essential to stabilize bituminous production. Washington contended that the cost of regulating the industry presents a great obstacle which can be hurdled only by the federal law equalizing the burdens upon the industry throughout the country and among the various States.

The National Bituminous Coal Commission issued General Order No. 16 on March 17 in which each producer having any mine within any district as defined in the Coal Conservation Act is required within fifteen days from the date of the order to file with the statistical bureau of his board cost and price realization data for the last three months of 1935.

General Order No. 17, approving standards of classifications of coals, methods of applying such standards and rules of procedure in classification of coals in all producing districts, was issued by the commission on March 21. In approving the classification standards the commission provided that the district boards take into consideration in classification work the following factors: (1) chemical analysis, (2) physical characteristics, (3) plant performance characteristics, and (4) market history and sales experience.

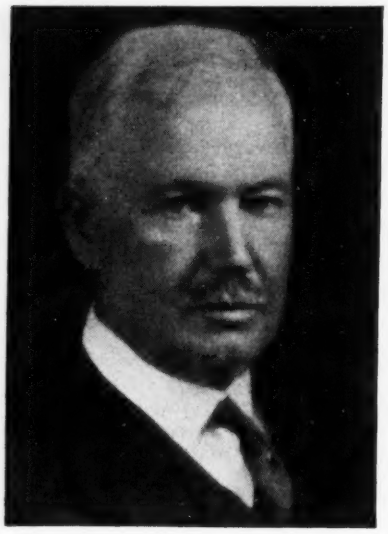
The commission pointed out in an accompanying opinion that the real purpose of the provision for classification contained in the Coal Conservation Act is not to accomplish a grouping of coals on any technical basis but "to assemble all coals into categories having common market characteristics in order to facilitate the work, first, of determining proper price relationships and, second, of properly applying these price relationships to particular coals when they are established." The approved regulations are the result of weeks of work on the part of the various district boards.

Obituary Notes

William J. Cummins, 74, chairman of the executive board of the Tennessee Products Corporation, Nashville, Tenn., died Feb. 24 from a heart attack in a Chicago hotel. He was one of the organizers of the Bon Air Coal & Iron Corporation, which was expanded into the Tennessee Products Corporation in 1925.

Frederick A. Sweet, 63, president of the Standard Coal Co., Salt Lake City, Utah, which he organized in 1912, died March 14 at Long Beach, Calif., from a heart attack, after ailing for two years. Born in Hinkley, Ill., he practised law in Salt Lake City some years before entering the coal industry. He was a former president of the Utah Coal Operators' Association, which he helped to organize, and also organized two or three other coal mining concerns in Utah in addition to the Standard. He also built a couple of coal railroads in the State. Until a year or two ago, he served the Standard company as general manager as well as president.

George W. Wilmot, 68, president of the Wilmot Engineering Co., Hazleton, Pa., and a well-known engineering authority in the anthracite region, died March 2 at his home in Hazleton, of pneumonia. At the age of 12 he went to work as a



The late George W. Wilmot

breaker boy, and for 15 years worked at various mines in the hard-coal region, devoting his evenings to the study of mining engineering. He became assistant superintendent of the Upper Lehigh Coal Co. mines, serving for five years, and later was named superintendent of the Maryd mines. He founded the company which bears his name in 1908.

George G. Crawford, 66, president of the Tennessee Coal, Iron & Railroad Co. from 1907 to 1930, and from the latter date until 1934 president of the Jones & Laughlin Steel Co., died March 20 at Birmingham, Ala., after an illness of several weeks.

George H. Theiss, 47, president, Duquesne Coal & Coke Co., Pittsburgh, Pa., died March 6 of pneumonia.

Charles E. Reed, 58, secretary of the West Kentucky Coal Bureau for the last 18 years, died March 10 in St. Joseph's Infirmary, Louisville, of heart disease after a lingering illness. During the World War, Mr. Reed was connected with the Fuel Administration and previously had been with the coal traffic department of the Louisville & Nashville R.R.

Charles Stockton Thorne, 68, formerly vice-president, Pocahontas Fuel Co., died March 6 in Atlantic City, N. J., of a heart attack. Previous to the formation of the Pocahontas Fuel Co., he had been president of the Southwest Improvement Co., later known as the Pocahontas Consolidated Collieries Corporation. He had retired from business about ten years ago.

William E. Leake, 71, executive vice-president, Railway Fuel Co., died March 16 in Birmingham, Ala., from a heart attack. He had been actively identified with the coal industry in the Birmingham district for about 40 years, having been vice-president of the Alabama Co. prior to its merger with the Sloss-Sheffield Steel & Iron Co., about twelve years ago.

J. E. Lee, general manager, Sheridan-Wyoming Coal Co., Sheridan, Wyo., met his death Feb. 25 in an automobile accident while en route to Denver to attend a hearing by the National Bituminous Coal Commission.

New Preparation Facilities

Elkhorn Piney Coal Mining Co., No. 1 mine, Stanaford, W. Va.; contract closed with the Fuel Process Co. for chloride washer for treating nut coal; capacity, 40 tons per hour.

Harleigh Brookwood Coal Co., Lawrence Colliery, Mahanoy Plane, Pa.; contract closed with the Wilmot Engineering Co. for Hydrotator plant, including sizing screens, complete Hydrotator unit and dewatering screens, for No. 4 buckwheat; capacity 35 tons of cleaned coal per hour.

High Splint Coal Co., High Splint, Ky.; contract closed with the Morrow Mfg. Co. for four-track six-grade tipple, including mine-run feeders and conveyors, shaker screens, loading booms, storage bins and loading and unloading facilities for two grades, refuse conveyor and crusher, and conveyor and vibrating screen equipment for use in connection with two American air tables for cleaning minus 2-in. material; over-all capacity, 400 tons per hour; probable date of completion, July 15.

Penn Central Light & Power Co., Hickory No. 1 mine, Saxton, Pa.; contract closed with the Pittsburgh Coal Washer Co. for all-steel-and-concrete washing plant, including two two-compartment Llewellyn washers for handling 2½x¼-in. low-volatile coal at the rate of 120 tons per hour and facilities for crushing and retreatment of rejects from the second compartments of both washers.

Raleigh-Wyoming Mining Co., Glen Rogers, W. Va.; contract closed with the Fuel Process Co. for chloride washer for treating nut coal; capacity, 50 tons per hour.

2:1 Ratio Not Required

Contrary to the statement in the preparation review in the February, 1936, *Coal Age*, pp. 66-70, a feed with a size ratio of 2:1 is not required with the Vissac jig, states G. A. Vissac, West Calgary, Alberta, the designer. Stressing the fully automatic features of the equipment, Mr. Vissac points out that the new preparation plant of the Northwestern Improvement Co., Roslyn, Wash., includes two Vissac jigs washing, respectively, the 4x1⅝-in. and 1⅝x⅜-in. sizes, thus disproving the contention that a 2:1 ratio is necessary.

Court Curbs Bootleg Mining

Official action to curb unauthorized mining of anthracite really got under way on Feb. 27, when the State Attorney General's office announced that court orders had been issued to 61 unhired miners prohibiting them from removing coal from above the Cameron colliery of the Stevens Coal Co., near Shamokin, Pa. Michael J. Hartneady, Secretary of Mines, said the unauthorized operations endangered the lives of regular miners working underground. The temporary injunction was extended indefinitely by the Northumberland County Court at a hearing held Feb. 29 at Sunbury, no date having been set for final hearing.

After a study embodying what it terms "the most comprehensive check of trucked

coal ever made," the Anthracite Institute asserts that stolen, or "bootleg," anthracite was sold in 1935 in Pennsylvania at the rate of 2,423,000 tons annually; Maryland took 396,700 tons; New Jersey, 368,300 tons; New York, 309,900 tons; Delaware, 89,000 tons, and the District of Columbia, 14,800 tons. Adding that such coal had begun to be trucked into New England and Virginia, the institute estimated the total movement of stolen anthracite last year at 3,607,600 tons, a gain of 18 per cent over that of 1934; interstate shipments increased 84 per cent. In the same periods, the shipments by truck of legitimately mined coal from the anthracite region declined 38 per cent.

Holmes Awards for Safety

Awards for heroic conduct in the effort to save human lives and in recognition of meritorius safety records in bituminous coal mines were announced March 5 by the Joseph A. Holmes Safety Association. A gold medal was bestowed on John Wiggins, an employee of the High Shaft mine, Steubenville Coal & Mining Co., Steubenville, Ohio; silver medals went to Harry A. Berger, Dwight Kirkland, Raymond Smith and Charles Woolbright, No. 5 mine, Centralia Coal Co., Centralia, Ill.; certificate of honor and button to Henry Lash, Andy Sovich, Alex Johnson and Cooper Kutz, Vesta Coal Co., California, Pa. Certificates of honor were awarded to the following companies and their employees:

Alabama—Lewisburg mine, Sloss-Sheffield Steel & Iron Co.; M. B. Ford, tipple foreman, Dixiana mine, Alabama By-Products Corporation; Walter Scott Rountree, M. D., Birmingham.

Colorado—Somerset mine, Calumet Fuel Co.

Illinois—Northern Illinois Coal Corporation; Mine No. 59, Peabody Coal Co.; Kathleen mine, Union Colliery Co.; Mine No. 11, United Electric Coal Cos.; Mine No. 15, Consolidated Coal Co. of St. Louis; Superior No. 3 mine, Superior Coal Co.; No. 1 mine, Valier Coal Co.; Evan W. Evans, miner, Valier; James E. Hutton, miner, Peoria; Thomas E. Vaughn, Harco.

Indiana—No. 4 mine, Linton-Summit Coal Co.

Kentucky—Crescent Coal Co.; Providence Coal Mining Co.; Luton mine and Mine No. 3, Providence Coal Mining Co.; Kentucky Block No. 2 mine and West Kentucky mines Nos. 3 and 6, West Kentucky Coal Co.; Diamond Coal Co.; C. C. Wilson, mine superintendent, South Hill mine.

New Mexico—Daniel P. King, superintendent, Crown Point mine.

Pennsylvania—Colonial No. 1 mine, H. C. Frick Coke Co.; Harwick mine, Harwick Coal & Coke Co.; Revloc mine, Monroe Coal Mining Co.; Northwestern Mining & Exchange Co., DuBois; Russellton mine, Republic Steel Corporation; Riley mine, Westmoreland Coal Co.; Osborn mines, Youghiogheny & Ohio Coal Co.; Nemacolin mine, Buckeye Coal Co.; Ellsworth No. 51 mine, Industrial Collieries Corporation; National No. 1 mine, National Mining Co.; South Union mine, South Union Coal Co.; Nairn-Callaghan Council, Holmes Safety Association, Hickory; Walter McLaughlin, general assistant mine foreman, Nemacolin mine, Buckeye Coal Co.; Joseph Nypaver, assistant mine foreman, Russellton mine; James Winning, Uniontown.

Utah—Columbia mine, Columbia Steel Co.

Virginia—Arno colliery, Stonega Coke Works, and Stonega mine, Stonega Coke & Coal Co.; Clinchfield Nos. 3, 7 and 8 mines, Clinchfield Coal Corporation; R. C. Thomas, assistant foreman, Clinchfield Coal Corporation, No. 3 mine.

Washington—Roslyn-Cle Elum mines Nos. 5, 7 and 9, Northwestern Improvement Co.

West Virginia—Mines Nos. 32 and 63, Consolidation Coal Co.; Sprague mine, Cranberry Fuel Co.; Ingram Branch mine, Elkhorn Piney Coal Mining Co.; Mobley mine, Elm Grove Mining Co.; Island Creek Nos. 1 and 20 mines, Island Creek Coal Co.; Ward mines and Maiden mine, Kellys Creek Colliery Co.; Berwind No. 1 mine, New River & Pocahontas Consolidated Coal Co.; Pond Creek Colliery, Thacker No. 3 mine, Norfolk & Western Ry.; United States Coal & Coke Co.; Micco mine, West Virginia Coal & Coke Corporation; United mine, Cabin Creek Consolidated Coal Co.; Mines Nos. 1, 3, 5 and 6, Cannelton Coal & Coke Co.; Crane Creek mine, American Coal Co. of Allegany County; William Nicholson, section foreman, Omar; J. E. Hight, tipple foreman, Boone County Coal Corporation.

Wyoming—Grover Wiseman, unit foreman, Superior "B" mine, Union Pacific Coal Co.; No. 4 mine, Union Pacific Coal Co.

Mine Fatality Rate Lower Than Year Ago

Coal-mine accidents caused the deaths of 80 bituminous and 29 anthracite miners in January, according to reports furnished the U. S. Bureau of Mines by State mine inspectors. With a production of 38,600,000 tons, the bituminous death rate in January was 2.07 per million tons, compared with 2.41 in the preceding month, when 34,829,000 was mined, and 2.17 in January, 1935, in mining 36,393,000 tons. The anthracite fatality rate in January was 5.56, based on an output of 5,219,000 tons, as against 2.81 in the preceding month, when 4,620,000 tons was produced, and 7.56 in January, 1935, when production was 5,691,000 tons. For the two industries combined, the death rate in January last was 2.49, compared with 2.46 in the preceding month and 2.90 in January, 1935.

Utah Grants Tax Relief

Tax reductions amounting to 50 per cent when figured on the value of coal in the types of land in which changes in rates were made were granted Utah coal operators by the Tax Commission of that State on March 17. The highest rated land—Classes A and B—were not included in the reductions. The operators had asserted that their tax load was too high for the amount of business they do. Class A lands in Utah, it is estimated, contain 47,539,922 tons of coal, the assessment rate being 4c. a ton; Class B, 154,081,167 tons, at 2.25c.; Class C, 87,472,204 tons ,at 0.50c.; Class D, 166,894,000 tons, at 0.07c. per ton.

State Fund to Dewater Mine

An appropriation of $100,000 for equipment to pump out the No. 18 mine of the Old Ben Coal Corporation, Johnston City, Williamson County, Ill., was permitted to become a law on March 21 without Governor Horner's signature. The appropriation was passed by large majorities in both houses of the Legislature, but the question was raised as to the constitutionality of using State funds to help a private industry. The old Ben mine has been closed since Dec. 2 last, when underground floods broke through seals in the mine (February *Coal Age*, p. 85).

Fires Damage Coal Plants

The tipple, conveyor gallery and machinery at the recently reopened mine of the Louise Coal Co., at Louise, Brooke County, W. Va., were destroyed by fire on March 2, causing a loss estimated at $50,000. The mine, which had been idle for four years, had been recently acquired and rehabilitated by the Marshall Jones interests, of Pittsburgh, Pa.

Fire on the night of March 9 damaged the tipple of the Powhatan Coal & Coke Co., at Powhatan, W. Va., to the extent of approximately $50,000. The blaze originated in the oil house.

Damage estimated at $15,000 was caused by a fire of unknown origin early on March 9 at the Royal Oak mine, operated by the G. & E. Coal Co., near Belleville, Ill. The flames destroyed the office, boiler room and washhouse and damaged machinery and boilers.

White Star Opens Stripping

With a maximum daily capacity of 350 tons, shipments from the new strip mine of the White Star Coal Mining Co., Inc., Rockville, Parke County, Ind., were scheduled to start in March. Production will come from a block seam averaging 33 in. in thickness and overlaid with an average of 20 ft. of overburden. Stripping will be done by a Koehring 702 gas-driven dragline with 2-cu.yd. dipper and 65-ft. boom, and the coal will be loaded by a Koehring gas shovel with $1\frac{1}{4}$-cu.yd. coal dipper. Trucks will transport the coal from the pit to the tipple, designed for truck service and equipped with shaker-screen picking tables and storage pockets for storing and loading lump, egg, nut and slack. F. M. Hall heads the company.

Illinois Strike Short-Lived

Progressive miners of Saline County, Illinois, who went on strike March 5 in protest against the employment of non-resident members of the United Mine Workers to operate Peabody No. 43 mine, returned to work March 9. The Peabody Coal Co. reopened No. 43 mine on March 2 under a U.M.W. contract after a shutdown of more than two years. Nearly 3,500 Progressives employed by the Sahara, Wasson, Rex and Blue Bird companies observed a two-day walkout, but mines Nos. 43 and 47 of the Peabody company, employing about 800 U.M.W. men, continued to work.

Financial Reports

American Coal Co. of Allegany County —Net profit for 1935, $45,723 after depreciation, depletion, federal taxes and other charges, as against $155,278 profit in 1934.

Clinchfield Coal Corporation—Net operating loss for 1935, $67,754 after taxes, depreciation, depletion, interest and other charges, but exclusive of credit of $18,007 from purchase of preferred stock at less than par. This compares with net operating profit in 1934 of $20,921, excluding credit of $67,829 from purchase of preferred stock at less than par.

Consolidated Coal Co. of St. Louis—Net income for 1935, $12,521 after expenses, interest and other charges, compared with net loss of $27,096 in 1934.

Consolidation Coal Co.—Income for 1935, covering ten months' operations

under trustees and two months as reorganized, $663,183, including $57,542 from North Western Fuel Co., a wholly owned subsidiary.

Glen Alden Coal Co.—Net income for 1935, $1,757,290 after depreciation, depletion and other deductions, compared with $3,375,536 in 1934.

Hudson Coal Co.—Net loss for 1935, $666,221 after depletion, depreciation, interest, taxes and other charges, against $503,-447 loss in 1934.

Lehigh Coal & Navigation Co.—Consolidated net income for year ended Dec. 31, $206,946 after charges and taxes, compared with $1,590,806 for 1934.

Lehigh Valley Coal Corporation and subsidiaries—Net income for 1935, $461,751 after interest, depreciation, depletion, federal taxes, minority interest and other charges, compared with profit of $722,052 in 1934 after taxes and charges but before minority interest.

New River Co.—Net profit for 1935, $404,567 after depreciation, depletion, federal taxes and other charges, compared with $791,364 earned in 1934.

Pennsylvania Coal & Coke Corporation and subsidiaries—Profit for quarter ended Dec. 31, $66,659 after ordinary taxes, depreciation and depletion but before federal income taxes, contrasted with loss of $94,-289 in the preceding quarter and profit of $37,465 in the fourth quarter of 1934.

Philadelphia & Reading Coal & Iron Co. —Net loss for 1935, $5,114,302 after taxes, interest, depreciation, depletion and reserves, compared with a loss of $302,356 for 1934.

Pittsburgh Coal Co.—Net loss in 1935, $691,326 after all charges, compared with a profit of $146,304 in 1934. Gross sales in 1935 were $40,618,435, against $36,587,-697; cost of sales and expenses, $36,614,-186, compared with $31,457,933 in the preceding year.

Pittsburgh Terminal Coal Corporation—Net loss for 1935, $538,005, compared with loss of $352,836 for 1934.

Pond Creek Pocahontas Co.—Net profit for 1935, $402,990 after interest, depreciation, depletion, federal taxes and other charges, against $552,906 profit in 1934.

Truax-Traer Coal Co. and subsidiaries —Profit for quarter ended Jan. 31, excluding discount on debentures purchased for sinking-fund requirements, $170,344 after depreciation, depletion and interest, but before federal taxes. This compares with profit of $36,250 in the preceding quarter and of $87,991 in January quarter of previous year.

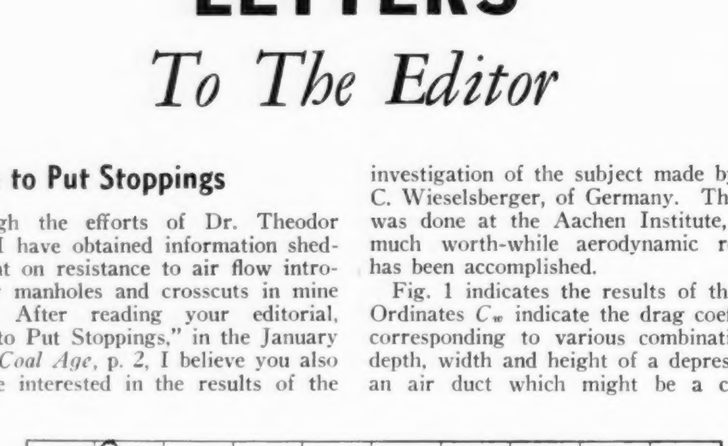
United Electric Coal Cos.—Net profit for quarter ended Jan. 31, $66,742 after expenses and other charges, compared with net loss of $8,575 in preceding quarter and net profit of $46,921 in January quarter a year ago.

LETTERS
To The Editor

Where to Put Stoppings

Through the efforts of Dr. Theodor Troller I have obtained information shedding light on resistance to air flow introduced by manholes and crosscuts in mine entries. After reading your editorial, "Where to Put Stoppings," in the January issue of *Coal Age*, p. 2, I believe you also would be interested in the results of the investigation of the subject made by Prof. C. Wieselsberger, of Germany. The work was done at the Aachen Institute, where much worth-while aerodynamic research has been accomplished.

Fig. 1 indicates the results of the tests. Ordinates C_w indicate the drag coefficients corresponding to various combinations of depth, width and height of a depression in an air duct which might be a crosscut closed by a stopping or a manhole. From these curves it is evident that the stopping is best located at a distance from the entry wall not less than the width of the crosscut and that a depth equal to that width is about the best arrangement. The curves also show that crosscut width should be one-fourth its height for lowest resistance.



Relation of drag coefficient to dimensions of depression in air duct

This does not suit mine practices, but it is consoling to see that all widths give low resistance at depths about equal to crosscut width. The resistance is lowest where width equals depth because at this ratio only one main eddy is formed in the opening. Other ratios introduce secondary eddies which increase the resistance to flow. The curves further indicate that the editorial suggestion of a curtain or wall at the end of the crosscut has merit, but that for good results this wall should be an exact continuation of the entry wall. Tests were made at an air velocity of 131 ft. per second. The drag coefficient C_w is equal to

$$\frac{D}{\frac{p}{2} \times V^2 bt}$$

where D is drag in pounds, p is in slugs (= weight in pounds/g) per cubic foot, V is in feet per second, b and t are in feet. As product of drag and air velocity passing the opening is power in foot-pounds per second, the horsepower lost at an opening 6x6x2.1 ft. deep if the velocity in the entry is 131 ft. per second, is as follows: $D = \frac{1}{2} C_w \, p \, V^2 \, bt$.

$$\frac{DV}{550} = H.P. = \frac{0.035 \times 0.00234 \times 131^{-3} \times 6 \times 6}{2 \times 550} = 6.02 \text{ hp.}$$

If the opening were 6x6x6 ft., the loss would be 2.54 hp.

Though the study was made at a higher velocity than is encountered in mine practice, the results may be used as a guide in the construction of manholes or locating crosscut stoppings.

A. Lee Barrett
Pittsburgh Coal Co.
Library, Pa.

Streamlining Airways

Streamlining of airways—discussed in your editorial "Mile a Minute," November, 1935, p. 440—should be quite an achievement where it is absolutely necessary to have air forced at a rate of a mile a minute or more. It should be so much more practicable, where possible, to make more room for the air, thus cutting down its velocity. For slow air has many advantages, some of which are enumerated here. The same sized leak will not bleed away so much slow air; the outward temperature will not be carried so far into the mine as it would be by the fast current: thus causing less "so-called sweating," less cutting of the top and a less number of top falls; the slow volume would be equal to the fast one and still have that all-important advantage of carrying a more nearly proper amount of "aqua"; roughness, poor alignment and whatnot can be more favorably overcome by the slow volume, made slow by more room.

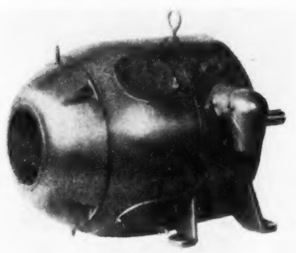
E. A. Smith,
Chief Engineer, Wells Elkhorn Coal Co.,
Estill, Ky.

WHAT'S NEW

In Coal-Mining Equipment

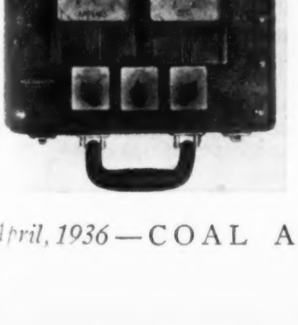
FAN-COOLED MOTOR; D.C. ANALYZER

Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa., announces a fan-cooled totally inclosed d.c. motor with an external fan and shroud on the commutator end for which it claims the same accessibility to armature as on straight totally inclosed motors. Removal of



but one cover from a bracket opening permits access to the brushes, it is stated. This is accomplished by casting integrally the inner supporting bearing bracket and the outer air shroud. The combination bracket therefore has air passageways between the shroud and the inner bracket except at the inspection openings, and this construction permits the use of an external blower on the commutator end without the disadvantage of having to remove two covers to examine the commutator. Also, as the blower is at the commutator end, the motor may be mounted snugly against a gear case or other surface.

Reduction in set-up and testing time is claimed for the new Westinghouse d.c. industrial analyzer, consisting of two instruments in a case 8x11x13 in. One instrument is an am-



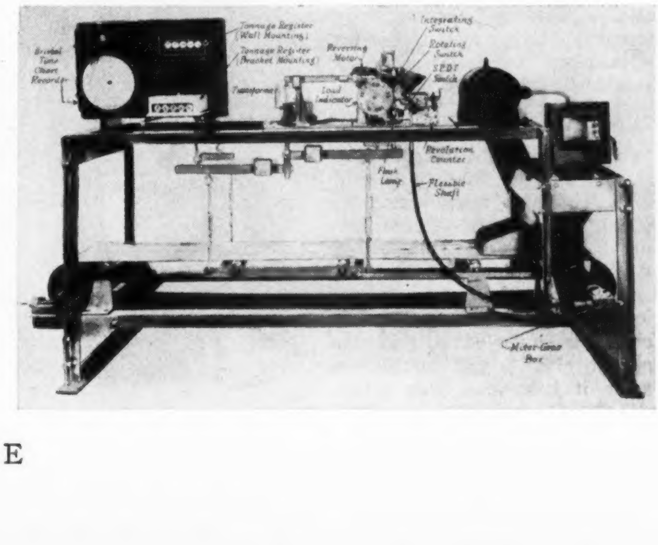
meter with self-contained shunts for 7½, 75 or 750 amp. The ammeter also can be changed to a 50-millivolt instrument by changing the position of the switch, permitting the use of any-range 50-millivolt shunt. The second instrument, with a switch for changing ranges, reads volts and ohms. Voltage ranges are 150, 300 and 750 volts. Ohm ranges are 5 to 500 at the center of the scale, and ohms can be read from 0.1 to 20,000. The two instruments permit reading amperes and volts at the same time.

MOTORS

A complete line of splash-proof squirrel-cage motors in ratings from ½ to 200 hp. for constant and multi-speed, continuous or intermittent duty in all voltages and cycles and for any torque or starting current is announced by the Imperial Electric Co., Akron, Ohio. Construction is said to provide for protection against splash or spray with proper ventilation.

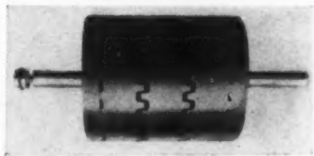
CONVEYOR SCALE

Fairbanks, Morse & Co., Chicago, offers a new conveyor-feeder scale for continuous weighing of materials in transit on a conveyor. The unit is self-contained, the company points out, and is available in lengths from 8 to 30 ft. and in any desired width. For the usual belt conveyor a suitable frame and means of suspending a section of the belt and integrating mechanism is provided. Simplicity and positive action are the principal features noted for the integrating mechanism, and the integration is stated to be in effect a system of counting, so that if 400 contacts are required to register 1 ton in a unit of time the weight value of each contact would be 5 lb., or 0.0025 ton. Tonnage conveyed in any period of time is read directly from a register.



MAGNETIC PULLEY

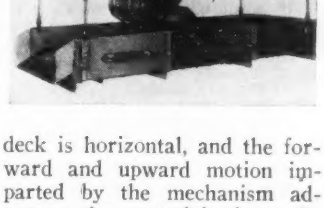
Magnetic attraction and range approximately 25 per cent higher than past figures are noted as features of the new high-intensity magnetic pulley developed by the Dings Magnetic Separator Co., Milwaukee, Wis. This has been accomplished, according to the company, by provision for proper heat dissipation and a properly designed magnetic circuit. Construction features include: transverse and longitudinal radiating ducts; winding to place each coil on its own bobbin, which forms the core and the two poles; separate bobbins securely keyseated to the pulley shaft; and corrugated inner and outer bobbin faces. This structure, it is asserted, presents maximum radiating surface, and air passing through the radial and longitudinal openings insures maximum heat dissipation.



Coil covers are heavy bronze. There is, the company points out, no short-circuiting of the lines of force between the two poles, as is the case when steel spacer rings are employed. The pulley shaft is turned and polished. Each pulley is supplied with set collars, bronze collector rings with double contact brushes for each, dustproof-collector-ring housing and approved steel switch cabinet in which are mounted a pilot lamp with bullseye indicator to show when current is flowing, fuse, switch and special counter EMF absorbing resistance.

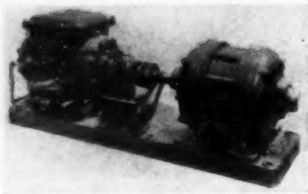
VIBRATING SCREEN; COMPRESSOR

Allis-Chalmers Mfg. Co., Milwaukee, Wis., offers a new line of screens designated as "LOW-HEAD vibrating screens" and designed for existing installations where headroom is at a premium, as well as for new plants desiring to conserve headroom or elevation. The screens are suspended by cables and springs, but the mechanism, the company states, has been designed particularly to impart to the body of the screen a straight-line motion at a definite angle relative to the horizontal. The



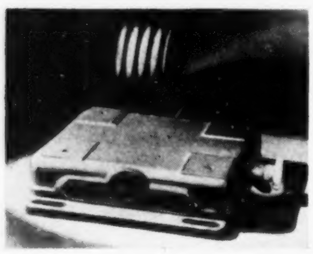
deck is horizontal, and the forward and upward motion imparted by the mechanism advances the material along the surface of the screen and segregates the finer material on the bottom, thus facilitating removal of the undersize. Successful operation with the discharge end higher than the feed end is reported by the company.

A new line of two-stage sliding-vane rotary air compressors bearing the designation "Ro-Twin" is another Allis-Chalmers offering. Both stages, as well as the intercooler, are contained in a single casing and, according to the company, the new units are lighter in weight, require less floor space, need only one stuffing box and coupling, are free of external piping



between stages, have a simpler lubrication system, are more easily kept in alignment, deliver air smoothly and free from pulsations, and are quiet, smooth and vibrationless in operation. Models vary from 20 hp., 1,740 r.p.m., to 100 hp., 690 r.p.m., for actual air deliveries of from 69 to 412 c.f.m. at a pressure of 100 lb. per square-inch gage.

Allis-Chalmers also offers the "Straitline" automatic ball-bearing motor base to supplement the "Motion-Control Vari-Pitch" Texrope sheave re-



cently announced. It provides, the company states, a convenient place from which to operate the Vari-Pitch sheave and maintains a uniform belt tension throughout the speed-range adjustment; also, it eliminates guess work, as the dial indicator shows the tension of the V-belts. The handwheel on the base controls the speed of the Vari-Pitch sheave and simultaneously moves the motor sufficiently to compensate for the change in centers between shafts resulting from the variation in Vari-Pitch sheave diameter.

CONTROLS

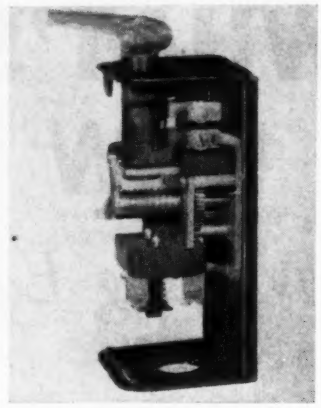
A magnetically operated switch of the single-pole double-throw type for gathering locomotives has been announced by the General Electric Co., Schenectady, N. Y. Designated

as Type 17GM2A, the switch transfers the power circuit automatically between trolley pole and reel without attention from the motorman. The desired circuit can be completed only when the trolley wheel or cable hook of that circuit is placed on the wire and the other collector is taken off. The new transfer switch has a weatherproof steel cover with spring latches easily removed without tools, the company states. It is 8 in. high, 10¼ in. long, and weighs 25 lb. Installation requires two supporting bolts, the connection of three power cables to terminals included with the switch and a control-wire connection to the ground. The switch is available in two models: A1, up to 250 volts with a minimum voltage of 90; A2, up to 500 volts with a minimum of 180. Both have continuous-current ratings of 200 amp. and hourly ratings of 300 amp.

Another General Electric offering is a new line of combination magnetic switches with maximum ratings of 25 hp., 220 volts, and 50 hp., 440 to 600 volts parallel. The new line, however, does not supersede a line of similar ratings incorporating a magnetic switch

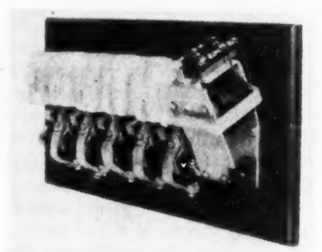
with overload relays for motor-running protection, all in the same case. In the new switches, air circuit breakers which can be reset by hand are used instead of fused safety switches. The breaker operating handle is interlocked with the inclosing-case door so that it cannot be opened when the breaker is closed and the breaker can be locked either open or closed from the outside of the case.

A new shipper-rod-operated master switch, which performs the function of a two-button momentary-contact pushbutton station, also is announced by General Electric. It possesses advantages over previous switches of this type, the company states, in that its magnetic contactor will pick up and seal in even when the shipper rod is operated rapidly, and will drop out and remain unenergized, in the case of voltage failure, even when the shipper rod does not complete its travel. A short time delay between making and breaking of the pick-up circuit is employed, so that this circuit always will be broken after it has once been estab-



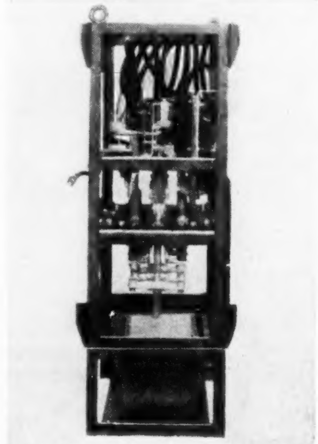
lished, regardless of the position in which the shipper rod is left.

General Electric also announces a new low-voltage alternating-current contactor which it states will stay closed through voltage disturbances or failures. Instead of using a mechanical-latching mechanism, which is subject to wear and usually requires adjustment, the new contactor is closed by a d.c. magnet energized through a copper-oxide rectifier, and is held closed by the attraction of a permanently magnetized core and the movable armature. A reversal of the coil-exciting current by means of a pushbutton or other pilot-control device



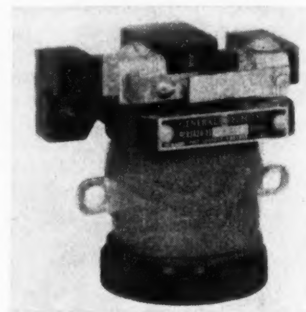
causes the contactor to open momentarily by "bucking down" the flux of the permanent magnet. The new device, the company states, is free from the usual transformer hum and has no coil losses while closed.

A high-voltage alternating-current contactor employing the



oil-blast principle of arc interruption and intended for use in completely oil-immersed motor controllers requiring moderately high interrupting capacity is a further General Electric development. The contactor is rated 200 amp. at 2,200 to 4,600 volts and will interrupt 50,000 kva. It is latched in and is tripped mechanically on short circuits by an instantaneous over-current relay. Thermal-induction relays give inverse-time protection for the motor in the event of sustained overloads; time-delay undervoltage protection also is provided.

Another new General Electric product is a thermal-induction relay designed for use in oil-



immersed motor controllers, which has tripping characteristics such that difficulty in starting high-inertia loads at full voltage is eliminated. In the new relay, a series line-current coil produces a flux in a magnetic core and induces a current in a copper sleeve around this core. Heat from this copper sleeve is directly conducted and radiated to a bimetallic strip whose deflection causes a set of contacts to either open or close. The contacts, normally closed, have a slow-opening action, preventing too quick tripping on overloads. In tripping at any load, localized temperatures are much lower than with heater-type relays hitherto used in oil, the company states, so that carbonization, with resulting changes in the characteristics, and sludging of the oil are avoided.

GOGGLE

An improved wide-vision chipping goggle for impact hazard work equipped with a new type super-safety lens that does not change the direction of light rays passing through the lens is offered by the Chicago Eye Shield Co., Chicago. Designated as the "Cesco" Style 220 goggle, the new equipment also is described as having a number of other improvements designed to insure greater safety, wearing comfort and maximum usefulness.